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THE IMPACT OF PERMANENT CHANGE OF STATION MOVES ON THE FAMILY INCOMES OF RATED AND NONRATED AIR FORCE OFFICERS

THESIS

Linda K. Lyons
Captain, USAF

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THE IMPACT OF PERMANENT CHANGE OF STATION MOVES ON THE FAMILY INCOMES OF RATED AND NONRATED AIR FORCE OFFICERS

THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Cost Analysis

Linda K. Lyons, B.S.
Captain, USAF

September 1988

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Linda K. Lyons

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List of Abbreviations

AF	Air Force
AFMPC	Air Force Military Personnel Center
ANN	Annuity
BAQ	Basic Allowance for Quarters
BAS	Basic Allowance for Subsistence
CONUS	Continental United States
DITY	Do-It-Yourself
NPV	Net Present Value
O/S	Overseas
PCS	Permanent Change of Station
PV	Present Value
TLE	Temporary Lodging Expense
YOS	Year Of Service

List of Variables

Variable	
ACADEMY	Academy graduate
AGE	Age of spouse
ASIAN	Asian nationality
BLACK	Black race
BOONIES	Member proximity to population center
EDLEVEL	Enlisted education level
EDUCATION	Education level of spouse
EDUC*SKILL	Combined spouse education and skill levels
FLTPAY	Member receives flight pay
FT	Full-time
FTINC	Full-time income
HUSBAND	Member and spouse living at same location
KIDS	Number of kids
LESS15	Number of dependents less than 15 years old
LT12	Spouse married less than 12 months
MAGE	Age of member
MAGE2	Squared age of member
MCIVERNS	Member gross earnings from civilian job
MILINC	Military income
MILLS	Heckman's sample selection bias
MMONTHS	Months at present geographic location
MNONWAGE	Total non-wage income in 1984
MOVERSEA	Total months spent overseas while in military
MRANK	Rank of member

Variable	
MSEADUTY	Total months spent at sea while in military
MTOTDEBT	Total non-mortgage debt
OED	Officer education level
OMA	Officer with Master's degree
OPHD	Officer with Doctorate degree
OVERSEAS	Number of months spouse has spent overseas
PROPAY	Member receives pro pay for special skills
PT	Part-time
PTINC	Part-time income
SAGE	Age of spouse
SBOONIES	Spouse proximity to population center
SEPARATE	Member and spouse not living together
SMONTHS	Number of months spouse at present location
SSCHOOL	Spouse years of schooling
SWK	Spouse working
TENURE	Months spouse has worked at current job
WMOVES	Number of PCS moves made by wife
YEAR	Year of service

Abstract

The purpose of this study was to examine the effects of various numbers of Permanent Change of Station (PCS) moves on Air Force officer family income. The analysis also included a comparison between rated and nonrated officers. Only male military members with civilian spouses were considered, and the study was limited to military members with no more than 20 years of military service. In addition, only moves in which the spouse accompanied her husband were included. For this study, the number of PCS moves was varied between 5 moves and 9 moves during a 20 year career.

Three components of PCS moving costs were examined in detail: unreimbursed moving costs, spouse income lost as a result of relocation, and part-time income for the military member that is lost during a move. All three of these components impact the total family income of an Air Force officer and his family.

The data for this analysis was obtained from the 1985 Department of Defense Survey of Officer and Enlisted Personnel, the 1985 Department of Defense Survey of Military Spouses, and the 1987 PCS Cost Survey. Probability equations were developed to estimate the probabilities of the spouse working (both full-time and part-time). These

equations were then used to determine the expected values of spouse earnings for employment in the United States and overseas. The same procedure was used to estimate expected military part-time earnings. Finally, total expected family income was calculated for each of the 20 years of service.

An increase in the number of PCS moves has a negative impact on expected family income. In addition, rated officers have a higher annual family income annuity than nonrated officers.

THE IMPACT OF PERMANENT CHANGE OF STATION MOVES ON THE FAMILY INCOMES OF RATED AND NONRATED AIR FORCE OFFICERS

I. Introduction

General Problem

Every military family must, at one time or another, contend with Permanent Change of Station (PCS) moves. According to the responses to a 1985 Department of Defense survey, a typical Air Force officer moves more than six times on the average during a 20 year career.

Extensive costs are associated with virtually every PCS move. In addition to the out-of-pocket expenses of physically uprooting and moving a family, there are several other "costs" which can have an adverse impact on family income. These other costs include temporary loss of employment for a working spouse and the associated loss of tenure resulting from a move. This problem is of great concern to the Air Force because of its potential impact on an officer's decision to either make the Air Force a career or to get out of the service.

Among the officer ranks, spouse employment is very common. Military wives are at a disadvantage in the labor market, however, when compared with their civilian counterparts. One of the biggest reasons is the reality of

frequent moves. This characteristic high degree of mobility prevents many military spouses from obtaining the training and experience they need in order to get the high-paying jobs for which they could become qualified. They may also be discriminated against by potential employers as a result of their military status.

Research Objectives

According to the 1985 Department of Defense Survey of Officer and Enlisted Personnel, spouse employment contributes substantially to total family income for married officers. But when asked to evaluate aspects of their current duty location, the officers gave one of the lowest ratings to Federal and other civilian employment opportunities (11:viii-ix). The impact of PCS moves on Air Force officer family income needs to be examined in more detail. This paper will investigate the hypothesis that the number of PCS moves made by the spouse over a 20 year career has an effect on the total family income of an Air Force officer. The extent to which rated and nonrated officers differ in this regard will also be examined.

According to Major Arvin of the officer retention office at the Air Force Military Personnel Center (AFMPC), the retention rate for rated officers, particularly pilots, has shown an alarming decrease during the past five or six years. Officers are put into one of four categories: mission support, nonrated operations, navigators, and

pilots. Between fiscal year 1983 and the third quarter of fiscal year 1988, the retention rate for mission support officers dropped from 62% to 52%, and the rate for nonrated operations officers decreased from 69% to 58%. On the rated side, the retention rate for navigators has only fallen from 76% to 72%. But during the same time period, the retention rate for pilots has tumbled from 78% to only 45% (1). As a result, a comparison between rated and nonrated officers might shed some light on the problem. Specifically, the following questions will be addressed:

1) To what degree do unreimbursed moving expenses affect family income during a PCS move?

2) To what degree do PCS moves affect spouse income?

3) To what degree do PCS moves affect a military member's part-time income?

4) How important are the effects of these moves on total family income?

5) How does the impact of these moves differ for rated and nonrated officers at various times during a 20 year career?

Scope

The analysis that will be presented in this paper is based primarily on the 1985 Department of Defense Surveys of Officer and Enlisted Personnel and Military Spouses that were conducted by the Defense Manpower Data Center in Arlington, VA. Approximately 2,000 Air Force officers

responded to specific questions concerning their military background, present and past duty locations, career intentions, individual and family characteristics, dependents, military compensation, civilian labor force experience, family resources, and military life.

Additional data was obtained from the 1987 PCS Survey conducted by AFMPC. This is an annual survey that is sent to selected Air Force members who made a PCS move during the year. This survey addresses the costs incurred by a family in the process of moving to a new duty location.

Assumptions

In order to simplify the analysis, only male officers with civilian spouses are included in the analysis. In other words, unmarried officers and military couples (that is, military members married to military members) are not included.

The data set is further limited to those Air Force officers who were married within one year of entering the military. This limitation, as an example, excludes an officer who has been in the service for fifteen years before getting married. In addition, it is required that the officer be married only once during a 20 year career. Finally, the statistical analysis that will be presented in this study includes only the first 20 years of a military career.

Impact of Work Interruptions on Spouse Income

Several articles have been published concerning the labor force participation of military and civilian wives and the impact of an interruption. In a 1982 study, Mincer and Ofek determined that an interruption from the labor force (which occurs frequently with working military wives) results in lower real wages upon return to the labor force. In addition, the longer the period of non-work, the greater the drop in wages (12:3). They attribute this decline in real wages to the depreciation of human capital resulting from the work interruption. Human capital consists of the individual skills and abilities of workers, which can be improved through training and education (7:290).

Hayghe found similar results in his 1986 study. He emphasized the relationship between work interruptions and spouse employment difficulties. He concluded:

> . . . high mobility means frequent breaks in the wife's employment or education and training. One result is that her opportunities to develop a marketable career are disrupted; another is that she must search for jobs in unfamiliar geographic areas. Moreover, the concomitant lack of experience, training, and seniority may result in lower earnings for military wives. They may also experience some job discrimination because of the likelihood that they will not remain with an employer for very long. But, whatever the cause, or causes, of military wives' labor market problems, these problems continue to be a source of concern not only to the families themselves, but also to the Armed Services as a whole [8:33].

Components of PCS Moving Costs

For Air Force officers, PCS moving costs essentially consist of three components: 1) unreimbursed moving costs, 2) spouse income that is lost as the result of relocation, and 3) part-time income for the military member that is lost in the event of a move. These three categories will be discussed in detail in future chapters.

Overview

The next chapter will further investigate the impact of mobility on spouse income. In addition, a statistical comparison of selected variables for rated and nonrated officers will be presented and discussed. Chapter III will consider unreimbursed moving costs. Chapter IV will include an in-depth discussion of the methodology used to determine the impact of a move on both spouse earnings and military part-time earnings. Chapter V will discuss the impact of PCS moves on total family income, and a sensitivity analysis will be presented. Finally, concluding remarks and some recommendations will be presented in Chapter VI.

II. Mobility and Spouse Income

Impact of Mobility

Moving from duty station to duty station is a fact of life for Air Force officers and their families. One result of this high degree of mobility is the negative impact it can have on spouse employment. Not only is tenure lost when a move is made, but labor force interruptions have been shown to result in lower wages when work is resumed. In addition, periods of unemployment for military wives naturally result from PCS moves. A final consideration is the relationship between mobility, family size, and employment. Each of these factors (interruptions, unemployment, and family size) will be discussed.

Interruptions. In their 1982 study, Mincer and Ofek identified both long-term and short-term effects of labor force interruptions. In the long run, they discovered a drop in real wages of between 0.6% and 1.1% for every year of nonparticipation. A year of work experience, on the other hand, results in an increase of between 0.4% and 1.2% in the long run. When the effects of experience are included, the total cost of a one-year work interruption in the long run is a decline in wages of between 1.5% and 1.8% (12:9-11).

The short-term effect of an interruption is much greater. Including the effect of tenure that is given up

during a work interruption, the short-run decline in wages ranges between 3.3% and 7.6% per year (12:11). Mincer and Ofek also described a "rebound" effect in which wages are quickly restored upon return to the labor force, particularly during the first five years (12:7). In spite of this rapid recovery, they concluded that "returnees from the nonmarket do not fully restore their earnings potential" (12:3).

Corcoran, Duncan, and Ponza conducted a similar study in 1983, and their results were consistent with those of Mincer and Ofek. Using 13 years of data from the Panel Study of Income Dynamics, they determined that during the first year after an interruption, wage rates grow from between 5.8% and 6.4% per year. In addition, wages increase an average of 2.5% for each year of experience (2:506).

Corcoran, Duncan, and Ponza also discussed the amount of training received in part-time jobs compared to full-time jobs. They explained three reasons for the provision of less training to part-time workers. First, part-time workers have less incentive to receive on-the-job training since they are in the labor market for less time than full-time workers. Second, employers may be hesitant to provide training opportunities to part-time workers if they believe that these workers are more likely to quit. Third, skills acquired through training would depreciate more with part-time work since fewer hours are worked (2:510).

Sandell and Shapiro did a study that showed that investment in on-the-job training is directly related to future work expectations. They found that "the expectations of periods of withdrawal from the labor market has the effect of lowering the expected gain from investment in training, thus reducing early postschool investments in training" (13:338).

To summarize, interruptions in labor force participation such as those caused by military moves result in both short-term and long-term loss of wages. If the interruption is short, this decline in wages may be insignificant as a result of the "rebound" effect. However, additional earning potential is probably lost if the military spouse fails to invest in training opportunities because of her high degree of mobility.

Unemployment. Periods of unemployment are inevitable for working military spouses. In 1985, the unemployment rate for military wives 16 years and older was significantly higher than the corresponding unemployment rate for civilian wives who were 16 years and older. The unemployment rate for military wives was 17.8%, compared to a civilian rate of only 5.5%. The statistics are similar for the years 1970 through 1984, according to a study by Hayghe (8:32). To compound the problem, Grossman concluded that military wives with children suffered from unemployment most of all.

In addition, she showed that a military spouse's labor force participation rate was lower the younger her child (6:63).

Family Size. In a recent working paper, Gill, Haurin, and Phillips concluded that military families are generally larger than civilian families. As an example, military wives between the ages of 25 and 34 with between 12 and 16 years of schooling had 1,670 children per 1,000 white women in 1984. This compares with a figure of 1,387 for civilian wives in the same age and education categories (3:5). One explanation is that the high degree of mobility decreases the opportunity cost of having a child since the wife is temporarily forced out of the labor market anyway. As a result, total family size is affected by the number of moves made (3:20).

To summarize, mobility impacts family size by lowering the "cost" of having a child. This, in turn, affects labor force participation rates by military wives. Moreover, the birth of a child typically results in a longer interruption from the labor force than other causes of interruptions. According to Mincer and Ofek, the average interruption lasts 2.7 years, but "child bearing is associated with significantly longer interruptions" (12:11).

The combined effect of lost tenure, periods of unemployment, and increases in family size which correspond with military moves is an overall drop in spouse income. Gill, Haurin, and Phillips concluded that a military wife's

wage drops by approximately 3% for each move. In addition, her wage is reduced by roughly another 1.4% for each year of tenure that is lost as the result of a move (3:23).

Comparison of Rated vs Nonrated Officers

For purposes of this study, mean values for several different variables have been calculated. These values will be used later in determining total family income. The variables that will be presented here include: MWORK, MILINC, MCIVERNS, SWK, PT, FT, PTINC, and FTINC. Mean values for both rated and nonrated officers are shown for comparison purposes.

MWORK is a variable which represents military members working part-time in civilian jobs. As expected, these numbers are very low. In other words, not many officers supplement their income by holding down a part-time job. Table 1 below shows the members working by years of service. Years of service (YOS) are grouped into five categories: 0-4, 5-8, 9-12, 13-16, and 17-20 years of service. Members in the service for more than 20 years are not included.

Table 1
Military Members Working Part-time (MWORK)

YOS	Rated	Nonrated
0- 4	1.52	2.26
5- 8	2.08	5.88
9-12	5.04	4.88
13-16	8.04	5.85
17-20	2.78	6.06

The sample size for rated officers for MWORK was 503, while the sample size for nonrated officers was 973.

Table 2 shows average military income (MILINC) by years of service. The figures include wages and allowances for both food and housing. The numbers naturally increase as years of service increase, reflecting higher ranks. With the exception of the first four years, the average income is greater for rated officers than for nonrated officers. This is most likely the result of special pay such as flight pay. Sample sizes are the same as they were for Table 1.

Table 2
Military Income (MILINC) ($)

YOS	Rated	Nonrated
0- 4	25374.15	27352.95
5- 8	33770.59	32645.30
9-12	39002.01	36552.83
13-16	43798.41	40690.74
17-20	48031.17	44897.71

Table 3 below shows the civilian earnings of military members. It is difficult to see any pattern in the figures shown.

Table 3
Military Member Civilian Earnings (MCIVERNS) ($)

YOS	Rated	Nonrated
0- 4	4572.50	2450.00
5- 8	1400.00	8151.89
9-12	2416.67	2167.38
13-16	6130.00	2107.80
17-20	787.50	5430.75

The sample sizes were quite small as a result of the relatively few officers who work part-time. The sample size for rated officers was only 22, and the sample size for nonrated officers was 53.

Table 4 below shows the percentage of spouses working (SWK) in either full-time or part-time jobs. For both rated and nonrated, the percentage of spouses working is the greatest during the first four years of service. The percentages then drop over the next eight years before increasing again after 13 years of service. This initial drop might be due to interruptions caused by starting a family, as discussed earlier. The sample sizes for this table are the same as above.

Table 4
Percentage of Spouses Working (SWK)

YOS	Rated	Nonrated
0- 4	0.58	0.54
5- 8	0.42	0.44
9-12	0.34	0.37
13-16	0.44	0.45
17-20	0.44	0.52

Tables 5 and 6 show the percentage of spouses working part-time (PT) and full-time (FT), respectively. The spouses of rated officers are more likely to work part-time than full-time for all years of service. One possible explanation might be that they need more flexibility in their work schedules since their husbands might have erratic schedules (e.g., alert duty, temporary duty assignments,

etc). The spouses of nonrated officers, on the other hand, are more likely to work full-time than part-time for most years of service. The sample sizes for these tables are the same as those for Table 1.

Table 5
Percentage of Spouses Working Part-time (PT)

YOS	Rated	Nonrated
0- 4	0.30	0.23
5- 8	0.25	0.22
9-12	0.19	0.20
13-16	0.29	0.27
17-20	0.25	0.25

Table 6
Percentage of Spouses Working Full-time (FT)

YOS	Rated	Nonrated
0- 4	0.27	0.32
5- 8	0.18	0.24
9-12	0.14	0.18
13-16	0.14	0.19
17-20	0.19	0.28

The last two tables, Tables 7 and 8, show average values of spouse part-time (PTINC) and full-time income (FTINC). Incomes are generally a little lower for the spouses of rated officers than nonrated officers. It is also interesting to note that the average part-time income for both rated and nonrated decreases between 5 and 12 years of service, and then increases again after 13 years of service. The sample sizes for these tables are much lower. For Table 7, the sample size for rated is 131; for nonrated,

the sample size is 236. For Table 8, the sample size for rated is 91, while the sample size for nonrated is 228.

Table 7
Spouse Part-time Income (PTINC) ($)

YOS	Rated	Nonrated
0- 4	5039.40	5110.71
5- 8	3625.92	3917.09
9-12	2525.91	2855.33
13-16	1906.70	4689.07
17-20	4028.50	5554.29

Table 8
Spouse Full-time Income (FTINC) ($)

YOS	Rated	Nonrated
0- 4	13151.11	14642.67
5- 8	11145.41	14484.32
9-12	12001.88	12922.67
13-16	13078.00	14738.50
17-20	12611.43	13904.00

The tables presented in this chapter provide an overview to the primary components of PCS moving costs mentioned in Chapter I. The next chapter will examine the first of these components, unreimbursed moving costs, in more detail. Spouse income and military income will then be addressed in Chapter IV.

III. Unreimbursed Moving Costs

Description of Survey

A major component of PCS moving costs is the portion of moving expenses for which the member is not reimbursed by the government. Each year, the Air Force Military Personnel Center in San Antonio, TX, conducts a survey which polls a sample of military members who made a move during the year. The purpose of the survey is to identify potential problems with PCS moves. Approximately 800 Air Force officers responded to the 1987 survey. This paper summarizes the results of a working paper on this subject done by Giuliano, Lyons, and Troyanowski (4). The variables that make up unreimbursed moving costs will first be discussed in detail as they appear in the survey. The results will then be summarized and displayed in a table categorized by one of three move types: continental U.S. (CONUS) to CONUS moves, CONUS to overseas moves, and overseas to CONUS moves.

In order to determine the impact of a move, the out-of-pocket expenses that are directly incurred as the result of a move must be identified. In other words, expenses that would normally occur regardless of whether or not a move is made should not be included as unreimbursed costs. In addition, the costs associated with buying and selling a privately owned house are excluded since the investment

aspects cannot easily be differentiated from other elements of the decision.

Out-of-pocket expenses consist of two elements: total move expenses and auto expenses. The sum of these two factors must then be reduced by the government reimbursements that are provided to the member in order to come up with the total unreimbursed cost. Each category of expense will be considered separately.

Total Move Expenses

Total move expenses are broken down into three categories in the survey. These categories are before move expenses, during move expenses, and after move expenses. A series of questions address each category.

Before Move Expenses. Questions pertaining to expenses incurred before a move is made are listed in Table 9 on the next page. Some adjustments were necessary in order to simplify the analysis for the responses to lodging expenses (reference 3) and meal expenses (reference 4) incurred before the move. The survey requests that the member identify the total cost of lodging and meals from the date of packing household goods to the date of departure. This implies that these expenses are out-of-pocket, but it ignores the fact that the member continues to receive a basic allowance for quarters (BAQ) and a basic allowance for subsistence (BAS). In other words, lodging and food would have to be bought regardless of whether or not a move is

Table 9
Before Move Expenses

1) Moving-out expenses, not to include preparation or marketing of home for sale or rent

2) Deposits lost on rental housing due to breaking rental lease (do not include withheld deposits due to damages, wear & tear, missed rent payments, etc.)

3) Cost of temporary lodging from date of packing household goods to date departed old duty station

4) Cost of meals from date of packing household goods to date departed old duty station

5) Mobile home preparation

6) Pet care from date of packing household goods to date departed old duty station (boarding, cages, shipping containers, shots, not including food)

7) Child care from date of packing household goods to date departed old duty station

8) Preparation and shipment of household goods articles not shipped by the government

9) Additional insurance for household goods coverage during move

10) Car rental fees from date of packing household goods to date departed old duty station

11) Special items purchased due to climate of or conditions in new locations

12) Rental of vehicles or equipment for Do-it-Yourself (DITY) moves

13) Miscellaneous expenses

made. As a result, these two responses have been adjusted by subtracting out a calculated average amount (based on number of days in temporary lodging) of BAQ and BAS received

during the period for lodging expenses and meal expenses, respectively (4:2).

During Move Expenses. Questions concerning expenses borne during the actual move are shown in Table 10 below.

Table 10
During Move Expenses

1) Cost of temporary lodging from date departed old duty station to date arrived at new duty station

2) Cost of meals from date departed old duty station to date arrived at new duty station

3) Toll fees

4) Gasoline and oil (include costs of all automobiles driven)

5) Car repairs made en route to new station

6) Transportation costs other than for car

7) Car rental fees from date departed old duty station to date arrived at new duty station

8) Pet travel expenses, excluding food

9) Out-of-pocket mobile home transportation costs

10) Transportation costs to move your motorcycle, boat, trailer, or other vehicle, not to include primary automobile(s) or mobile home

11) Miscellaneous expenses

Once again, adjustments have been made to account for the receipt of BAQ and BAS. It is assumed that the average travel time authorized for a PCS move is 4 days (4:3). In addition to the adjustments to questions 1 and 2 in Table 10, two of the above questions have been omitted from the final count. Car repairs made en route to the new duty

location (reference 5 above) should not be included as an out-of-pocket expense related to the move because this type of expense is not dependent on a move occurring. In other words, if an automobile requires repair work, this will be the case whether a move is being made or not.

Finally, transportation costs to move items such as boats and trailers (reference 10 above) have been excluded since these items are luxury items to begin with. The government should not be expected to reimburse members for this type of an expense. Members know ahead of time that these expenses should be their responsibility to bear.

After Move Expenses. The final component of total moving expenses is after move expenses. These costs are listed in Table 11 on the next page. As before, adjustments have been made for lodging expenses (reference 1) and meal expenses (reference 2) incurred from the date arrived new duty station to the date household goods are delivered.

Auto Expenses

The second element of out-of-pocket expenses is auto expenses. Questions concerning auto expenses are shown in Table 12. As with the total move expenses described earlier, some allowances have been made for auto expenses. Specifically, questions 1 and 4-6 apply only to moves between CONUS and overseas (in either direction). This will be reflected in the expenses table at the end of the chapter.

Table 11
After Move Expenses

1) Cost of temporary lodging from date arrived new duty station to date household goods were delivered to new residence

2) Cost of meals from date arrived new duty station to date household goods were delivered to new permanent residence

3) Travel in vicinity of the new station to look for a new residence

4) Moving-in expenses, not including rent or security deposits

5) Damaged or lost household goods shipped by government

6) Damages caused by shipment/loss of household goods articles not shipped by government

7) Mobile home set-up

8) Pet care from date of arrival at new duty station to date household goods were delivered to new permanent residence

9) Child care from date of arrival at new duty station to date household goods were delivered to new permanent residence

10) Miscellaneous expenses

Government Reimbursements

After total move expenses and auto expenses are added together, the amount of government reimbursements must be subtracted in order to come up with the unreimbursed moving costs. Questions addressing this area are included in Table 13 on the next page. These reimbursements are self-explanatory and no adjustments are necessary. Total reimbursements for each type of move are shown in Table 14.

Table 12
Auto Expenses

1) If you moved a vehicle to or from overseas at personal expense, what were the total costs?

2) Cost of maintenance performed on automobile(s) to make road-worthy for long trip

3) Cost of special handling devices for automobile(s) NOTE: Include preparation costs for overseas, such as removal of high value items, modification of fuel exhaust system, etc.

4) Cost to deliver car(s) to port

5) Cost to pick up car(s) from port

6) If you stored an automobile, what was the total cost, to include delivering the automobile(s) to the designated location?

Table 13
Government Reimbursements

1) Member travel

2) Dependent travel

3) Dislocation allowance (equivalent to one month's basic allowance for quarters at the "with" or "without dependent" rate)

4) Funds received for a "Do-it-Yourself" (DITY) move

5) Mobile home allowance

6) Damaged household goods claimed, received, or expected to claim and receive

7) Temporary Lodging Expense (TLE) Allowance (E-4 and below with dependents)

Summary

Table 14 on the next page shows the total unreimbursed moving expenses for three categories of moves: CONUS to CONUS moves, CONUS to overseas (O/S) moves, and overseas to

CONUS moves (4:4). As discussed earlier, reimbursements are subtracted from the moving and auto expenses to get the total out-of-pocket expenses.

Table 14
Out-of-Pocket Expenses
Air Force Officers ($)

Expense	Move Type		
	CONUS-CONUS	CONUS-O/S	O/S-CONUS
Before Move	883.11	1106.05	1084.59
During Move	566.70	951.50	832.78
After Move	1627.21	1742.47	1891.09
Automobile	187.49	431.00	438.81
Sub-total	3264.51	4231.02	4247.27
Less Reimb	1423.53	1487.61	1436.27
Out-of-Pocket	1840.98	2743.41	2811.00

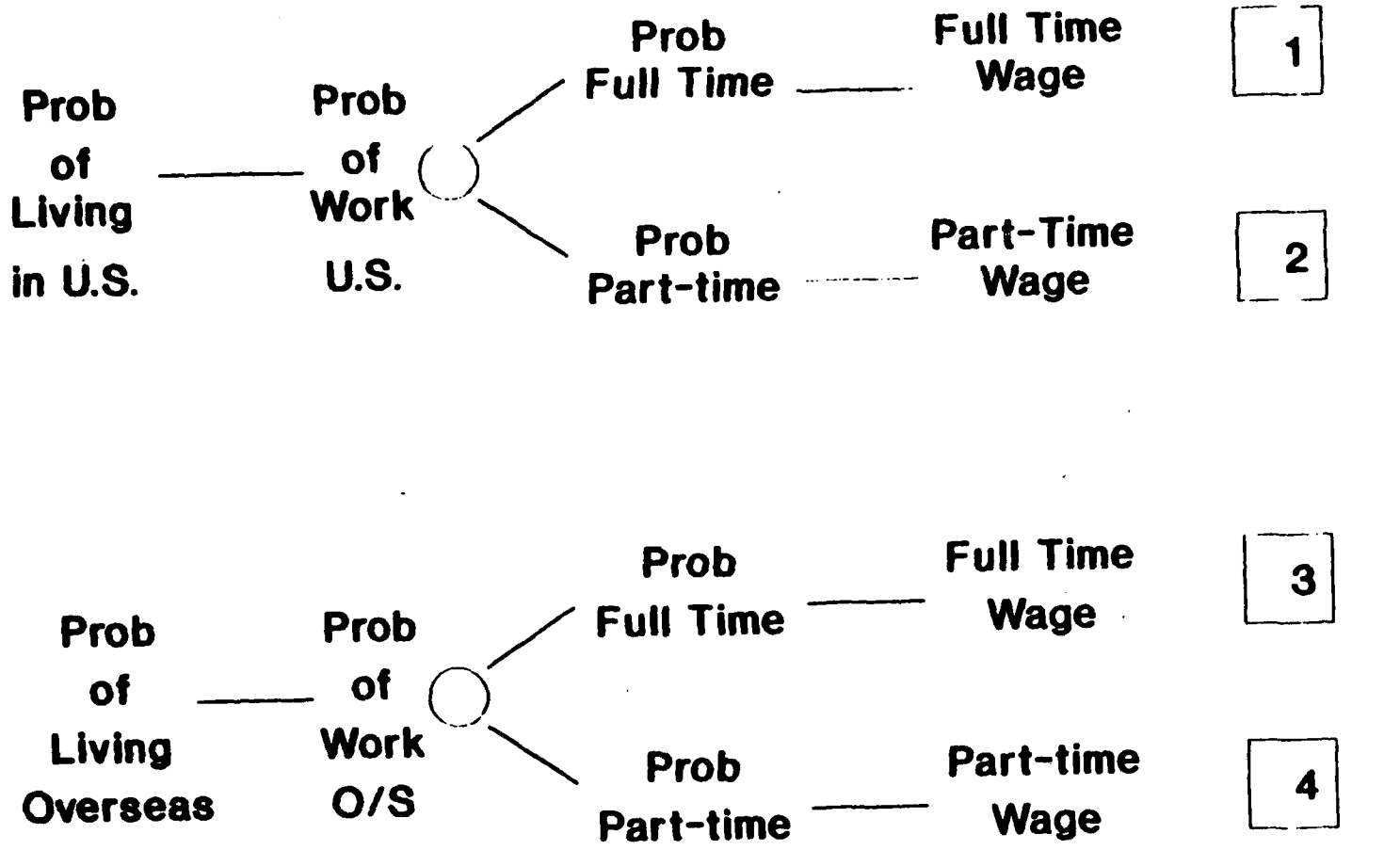
As expected, out-of-pocket expenses are substantially lower for CONUS to CONUS moves than for moves between the CONUS and an overseas location. The reimbursement figure is similar, but the during move expenses and the auto expenses are considerably lower. There is not much difference between the CONUS to overseas and the overseas to CONUS moves.

Thusfar, one component of PCS moving costs has been examined. In the next chapter, spouse income and military income will be addressed.

IV. Methodology

The two remaining components of family income that are affected by a PCS move, spouse income and military member part-time earnings, will be addressed in this chapter. In addition, military income will be discussed. According to a working paper by Giuliano, Lyons, and Troyanowski, the expected value of spouse income consists of the sum of four elements.[1] The expected value of military part-time income consists of the sum of two elements. Figure 1 on the next page indicates that the expected value of a wife's income is determined by adding together the results of four multiplications (5:3). The first result is equal to the probability of the wife working full-time in the United States times her full-time wage. The second result is equal to the probability of the wife working part-time in the United States times the median part-time wage for the United States. The third result is equal to the probability of the spouse working full-time overseas times the median full-time wage for overseas. The fourth result is equal to the probability of the spouse working part-time

[1]These authors have studied various aspects of military mobility as it affects the income of various groups. See Giuliano's thesis "The Impact of Permanent Change of Station Moves on Air Force Enlisted Family Income for Avionics and Non-Avionics Personnel", and Troyanowski's thesis "The Effect on Family Income of Varying the Frequency of Permanent Change of Station Moves". Their joint working paper developed estimating equations and other results which were applicable to each author's separate research.



Expected Value of Wife's Income = 1 + 2 + 3 + 4

Figure 1. Expected Value: Wife's Income for a Given Year

overseas times the median part-time income for overseas. As mentioned earlier, the expected value of the wife's income is the sum of these four multiplication results. They will be discussed in detail later in the chapter.

Expected military part-time income is made up of two elements: the probability that the member works part-time in the United States times the median part-time wage for the CONUS and the probability that the member works part-time overseas times the median part-time wage for overseas. The sum of the results of these multiplications equals the expected value of the member's part-time income. Military part-time income will be addressed later in this chapter.

Number of PCS Moves

Before addressing the issue of spouse income, the timing of PCS moves must be dealt with. Since the average number of spouse moves during a 20 year career is between 6 and 7, the number of moves will be varied between 5 and 9 for this analysis.[2] By doing this, the impact of the number of moves made during a 20 year career can be seen more clearly. If 5 PCS moves occur during a 20 year career, then a move is made every 48 months on the average. For 6 PCS moves, the average time between moves is 40 months. For 7 PCS moves, the average time between moves is 34.33 months;

[2]Within the sample, for every move the spouse of an Air Force officer made as a result of her husband's PCS move, the husband moved 1.12 times.

for 8 moves, 30 months; and for 9 moves, 26.67 months. The table below shows the years in which a move is made during a 20 year career in which the total number of moves is varied between 5 and 9. An X indicates a move during that year.

Table 15
Number of PCS Moves

YOS	5	6	7	8	9
1	X	X	X	X	X
2	-	-	-	-	-
3	-	-	X	X	X
4	-	X	-	-	-
5	X	-	-	-	X
6	-	-	X	X	-
7	-	X	-	-	X
8	-	-	-	X	-
9	X	-	X	-	X
10	-	-	-	-	-
11	-	X	-	X	-
12	-	-	X	-	X
13	X	-	-	X	-
14	-	X	-	-	X
15	-	-	X	-	-
16	-	-	-	X	X
17	X	X	-	-	-
18	-	-	X	X	X
19	-	-	-	-	-
20	-	-	-	-	-

Impact on Spouse Earnings

The biggest impact of a PCS move on total family income is realized in the area of spouse income. In order to calculate this impact, the probability of a spouse working or not working must be determined. In addition, given that the spouse works, the probability that she works full-time or part-time must also be determined. By doing this, the total spouse income can be calculated by multiplying the

appropriate probabilities by the annual income determined for both full-time and part-time employment in the CONUS and overseas. This means that six probability tables could be developed concerning the spouse: the probability of working if living in the CONUS, the probability of working full-time if working in the CONUS, the probability of working part-time if working in the CONUS, the probability of working if living overseas, the probability of working full-time if working overseas, and the probability of working part-time if working overseas.

Probability of Working in the CONUS. Since the dependent variable in the probability equations for working was a binary (zero or one) variable, the residuals were not normally distributed, resulting in heteroscedasticity. As a result, the regression equation was transformed so that the error terms follow a logistic distribution. Variable coefficients were then estimated using the maximum likelihood method of regression (10:16). Using this technique, thirteen variables proved to be significant in describing the work probabilities (5:4). Variable names, parameter estimates, Chi-square values, and levels of significance for wives working in the CONUS are shown in Table 16 on the next page.

SAGE represents the age of the spouse; it has a positive and significant coefficient, meaning that the probability of work should increase as spouse age increases. SSCHOOL stands for the number of years of schooling

SSCHOOL stands for the number of years of schooling completed by the spouse. OVERSEAS reflects the number of the spouse has spent overseas. SBOONIES is a variable which is used to describe the proximity of the military installation, in the opinion of the spouse, to a population center. BLACK is a variable used to identify black spouses. SMONTHS reflects the number of months the spouse has lived at the current location (excluding local moves). MTOTDEBT represents the total non-mortgage debt of the military member. With the exception of SBOONIES, all the variables mentioned have positive coefficients which are significant. The coefficient for SBOONIES is negative and significant.

Table 16
Maximum Likelihood Logit Equation
AF Officer Wives Working - CONUS

Variable	Parameter Estimate	Chi-Square	Prob
INTERCEPT	-3.349330	205.14	.0001
SAGE	0.048757	82.22	.0001
SSCHOOL	0.158028	154.99	.0001
OVERSEAS	0.031554	9.39	.0022
SBOONIES	-0.248617	10.21	.0014
BLACK	0.404734	11.29	.0008
SMONTHS	0.015379	163.72	.0001
MTOTDEBT	0.175508	151.85	.0001
LESS15	-0.260527	38.34	.0001
KIDS	-0.151704	12.65	.0004
HUSBAND	-0.378361	14.87	.0001
MILINC	-0.000034	109.96	.0001
MCIVERNS	0.000023	3.40	.0654
MNONWAGE	0.000000	0.03	.8533

LESS15 stands for the number of dependents under the age of 15 living in the household. KIDS represents the total number of kids in the household. HUSBAND is a

variable which indicates whether or not the military member is present at the current location (as opposed to being assigned to a remote location, for example). MILINC represents the total military income (including basic allowance for quarters, basic allowance for subsistence, and variable housing allowance). LESS15, KIDS, HUSBAND, and MILINC all have negative coefficients which are significant. MCIVERNS reflects the civilian earnings made by a military member working part-time. It has a very small positive coefficient that is significant. Finally, MNONWAGE represents the nonwage income earned by the military member such as inheritances, interest income from investments, etc. Its coefficient is positive and insignificant.

To obtain the probability of working in the CONUS, the parameter estimates in the table must first be multiplied by the mean values of each of the variables for each year of service (years 1 through 20). These mean values are included in Appendix A. Next, the product of the parameter estimates and mean values must be summed for all variables for each year of service. Finally, the probability for each year of service is calculated according to the formula:

$$P_i = 1 - [EXP(B_i x_i)/1 + EXP(B_i x_i)]$$

where $B_i x_i$ represents the product of the parameter estimates and mean values (10:25). The tables on the next page show the probabilities of the wife working in the CONUS with the number of moves varied between 5 and 9.

Table 17
Probability of AF Officer Wives Working - CONUS

a. Rated
Number of PCS Moves

YOS	5	6	7	8	9
1	.432198	.432198	.432198	.432198	.432198
2	.602742	.602742	.602742	.602742	.602742
3	.596519	.596519	.578508	.539989	.519879
4	.593573	.492162	.464029	.479358	.490881
5	.443164	.473700	.496744	.512121	.465401
6	.474930	.505667	.420794	.429250	.455801
7	.603050	.482551	.422929	.457019	.449397
8	.484749	.365133	.405167	.383136	.365133
9	.349314	.407094	.395395	.370568	.398770
10	.356897	.415132	.332587	.378344	.319075
11	.399460	.315007	.373936	.315007	.359650
12	.533767	.441810	.432665	.441810	.401210
13	.313216	.397467	.336825	.343730	.350701
14	.395198	.385439	.421197	.373369	.369778
15	.430188	.371182	.369986	.407730	.371182
16	.478523	.417748	.373654	.345336	.376357
17	.309132	.373529	.378340	.349865	.325791
18	.449262	.419048	.418424	.437875	.443561
19	.497342	.466634	.443755	.428627	.417367
20	.529865	.499143	.476093	.460776	.449336

b. Nonrated
Number of PCS Moves

YOS	5	6	7	8	9
1	.458752	.458752	.458752	.458752	.458752
2	.545151	.545151	.545151	.545151	.545151
3	.579079	.579079	.560862	.522063	.501892
4	.588113	.486519	.458417	.473724	.485238
5	.428039	.458390	.481371	.496741	.450130
6	.441992	.472515	.388830	.397084	.423120
7	.475499	.455095	.396267	.429809	.422288
8	.508840	.387753	.428592	.406158	.387753
9	.387911	.447683	.435674	.410033	.439143
10	.430864	.491935	.404685	.453620	.389956
11	.437554	.349738	.411263	.349738	.396454
12	.532559	.440613	.431474	.440613	.400044
13	.383740	.473872	.409496	.416954	.424450
14	.371850	.362323	.397323	.350564	.347071
15	.499121	.437927	.436666	.476071	.437927
16	.498696	.437509	.392736	.363812	.395490
17	.416099	.487069	.492193	.461511	.434893
18	.413584	.384095	.383489	.402440	.408000
19	.533998	.503293	.480234	.464903	.453446
20	.609629	.579988	.557359	.542133	.530660

There does not appear to be a substantial difference between the wives of rated officers and the wives of nonrated officers. For both categories, the probability of working gradually decreases as the number of moves increases. This is reflected in Table 18 below.

Table 18
Probability of
AF Officer Wives Working - CONUS
Rated vs Nonrated (20 yr avg)

	Number of PCS Moves				
Category	5	6	7	8	9
Rated	.458654	.442995	.428798	.424442	.418210
Nonrated	.477054	.461965	.447542	.443094	.436593

Probability of Working Full-time (CONUS). Now that the probabilities of the spouse working in the United States have been determined, the probabilities of the spouse working full-time or part-time can be addressed. The same techniques are used to calculate these probabilities. The parameter estimates, Chi-square values, and levels of significance for the spouse working full-time in the CONUS are shown in the table on the next page (5:6).

The variable coefficients all have the same signs as before except for MNONWAGE, which is negative. All variables are significant except OVERSEAS, SBOONIES, HUSBAND, MCIVERNS, and MNONWAGE. Table 20 shows the probabilities of the spouse working full-time in the CONUS. These probabilities are calculated by multiplying the probability of working in the CONUS by the probability of working full-time if working in the CONUS.

Table 19
Maximum Likelihood Logit Equation
AF Officer Wives Working Full-time - CONUS

Variable	Parameter Estimate	Chi-Square	Prob
INTERCEPT	-1.181090	13.06	.0003
SAGE	0.039691	24.90	.0001
SSCHOOL	0.050326	8.15	.0043
OVERSEAS	0.008615	0.43	.5100
SBOONIES	-0.007581	0.00	.9482
BLACK	0.369703	5.52	.0188
SMONTHS	0.007424	22.32	.0001
MTOTDEBT	0.143961	49.09	.0001
LESS15	-0.338280	32.43	.0001
KIDS	-0.128266	4.35	.0376
HUSBAND	-0.180887	2.02	.1548
MILINC	-0.000035	52.56	.0001
MCIVERNS	0.000018	1.22	.2692
MNONWAGE	-0.000000	0.10	.7506

Table 20
Probability of AF Officer Wives Working Full-time - CONUS

a. Rated
Number of PCS Moves

YOS	5	6	7	8	9
1	.208176	.208176	.208176	.208176	.208176
2	.385292	.385292	.385292	.385292	.385292
3	.364459	.364459	.348501	.315464	.298778
4	.342132	.259604	.238460	.249891	.258625
5	.220207	.242413	.259730	.271562	.236295
6	.237176	.260032	.199023	.204810	.223394
7	.251247	.236233	.194782	.218086	.212784
8	.220569	.144957	.168834	.155521	.144957
9	.127778	.160300	.153480	.139404	.155435
10	.124875	.156658	.112469	.136238	.105790
11	.149590	.105138	.135511	.105138	.127876
12	.256311	.192625	.186731	.192625	.167034
13	.101315	.144526	.112817	.116270	.119796
14	.148784	.143324	.163743	.136684	.134733
15	.163600	.130927	.130296	.150802	.130927
16	.188478	.152855	.129093	.114715	.130502
17	.093284	.123913	.126341	.112257	.100878
18	.188066	.169392	.169015	.180931	.184479
19	.221045	.200578	.185915	.176486	.169603
20	.248722	.226933	.211207	.201041	.193591

Table 20 (cont.)
Probability of AF Officer Wives Working Full-time - CONUS

b. Nonrated
Number of PCS Moves

YOS	5	6	7	8	9
1	.239485	.239485	.239485	.239485	.239485
2	.323943	.323493	.323943	.323943	.323943
3	.345749	.345749	.330014	.297582	.281277
4	.337903	.255714	.234714	.246064	.254741
5	.204157	.225433	.242095	.253512	.219561
6	.206061	.227287	.171086	.176353	.193360
7	.218585	.204738	.166945	.188112	.183278
8	.244526	.163555	.189367	.175005	.163555
9	.163193	.201407	.193472	.176966	.195751
10	.192464	.234261	.175588	.207634	.166358
11	.184268	.132344	.168008	.132344	.159121
12	.254779	.191327	.185459	.191327	.165853
13	.151717	.207864	.167014	.171553	.176165
14	.135520	.130391	.149619	.124167	.122341
15	.236196	.194326	.193500	.220009	.194326
16	.220073	.180361	.153498	.137083	.155099
17	.176930	.223750	.227314	.206349	.188877
18	.164326	.147181	.146837	.157757	.161020
19	.253862	.231823	.215898	.205594	.198040
20	.323980	.299636	.281742	.270021	.261352

The probabilities for the wives of rated officers are considerably lower than for nonrated officers. The probabilities gradually decline as the number of PCS moves increases for both categories, as shown in Table 21.

Table 21
Probability of
AF Officer Wives Working Full-time - CONUS
Rated vs Nonrated (20 yr avg)

Number of PCS Moves

Category	5	6	7	8	9
Rated	.212055	.200417	.190971	.188570	.184447
Nonrated	.228886	.218029	.207780	.205043	.200175

In order to complete the first equation illustrated in Figure I, the wife's full-time wage for the United States must be determined. A wage equation for a wife's full-time weekly wage was developed in a study by Gill, Haurin, and Phillips (3:11). Table 22 on the next page shows the variable names, parameter estimates, t values, and levels of significance for the variables used in this equation. Ten variables are included. AGE and EDUCATION correspond to SAGE and SSCHOOL described earlier.

TENURE represents time at the current job and it is measured in months. The purpose of this thesis requires varying the number of spouse moves from 5 to 9. Since each spouse move affects the number of months a spouse is at a given location (which, in turn, affects job tenure), the following relationship was estimated and used to calculate expected tenure:

TENURE = -6.0551 + 7.341178 X LT12 means + 0.53368518 X SMONTHS means

The variable LT12 is introduced into the tenure equation to account for military members who marry someone who is currently employed and may have already established some tenure. In other words, LT12 is a dummy variable which indicates a spouse who has been married less than 12 months and who is therefore more likely to have job tenure which exceeds her husband's time on station (5:7). SMONTHS is the number of months at the current location.

The next variable included in the wife's wage equation is EDUC*SKILL, which is an interaction term that combines EDUCATION and SKILL. All of the above variables have positive and significant coefficients.

Table 22
Equation for Wife's Full-time Weekly Wage

Dependent Variable: Log of Wife's Weekly Wage
Sample Size: 457
Adjusted R-Square: .3308

Variable	Parameter Estimate	t	Prob > t
INTERCEPT	3.90330	26.423	.0001
AGE	0.02581	6.382	.0001
EDUCATION	0.05714	7.586	.0001
TENURE	0.00116	2.299	.0220
EDUC*SKILL	0.01436	6.064	.0001
SOVERSEAS	-0.01021	-1.318	.1882
BOONIES	-0.04960	-1.005	.3154
BLACK	-0.08724	-1.232	.2187
ASIAN	-0.10159	-1.774	.0767
MILLS	0.10001	1.814	.0704
WMOVES	-0.02978	-3.139	.0018

SOVERSEAS indicates the number of months the spouse has spent overseas with her husband. BOONIES is the military member's evaluation of the proximity of the military installation to a population center. BLACK and ASIAN are variables used to identify minorities. The four variables just described all have negative coefficients in the wage equation. ASIAN is the only one that is significant.

MILLS is a variable created by Heckman to account for sample selection bias (9:153). Its coefficient is positive and significant. Finally, WMOVES indicates the total number of PCS moves made by the spouse during her husband's career.

The sample excludes spouses that have made 10 or more moves (3:12). The coefficient for WMOVES is negative and significant.

In order to determine the annual full-time wage for spouses working in the United States, the parameter estimates from Table 22 must be multiplied by the mean values of each of the variables for each year of service. These mean values are included in Appendix B. Next, the product of the parameter estimates and mean values must be summed for all variables for each year of service. Finally, the antilogs of these sums are calculated and then multiplied by 52 to come up with an annual wage. Table 23 shows the annual full-time income for spouses working in the CONUS.

The expected value os spouse income for full-time work in the CONUS can now be calculated by multiplying the probability of working in the CONUS (Table 17) times the probability of working full-time in the CONUS (Table 20) times the expected full-time wage (Table 23) times the percent of spouses living in the CONUS, which is 87.76824% for the wives of rated officers and 89.377289% for the wives of nonrated officers. This completes the first branch of the diagram in Figure 1 on page 25.

Table 23
Expected AF Officer Spouse Income ($)

a. Rated
Number of PCS Moves

YOS	5	6	7	8	9
1	11628.49	11628.49	11628.49	11628.49	11628.49
2	11830.42	11830.42	11830.42	11830.42	11830.42
3	12519.94	12519.94	12420.73	12220.89	12090.88
4	12898.59	12437.99	12259.35	12289.75	12312.60
5	12747.15	12810.44	12858.11	12889.99	12572.95
6	12743.94	12807.21	12538.31	12278.47	12331.79
7	13066.79	12895.07	12519.57	12589.52	12449.74
8	13302.92	12659.31	12745.81	12510.88	12287.87
9	12946.22	13075.09	12888.56	12613.13	12642.38
10	13487.64	13621.90	13035.28	13140.61	12621.52
11	13446.29	12859.28	12995.33	12481.97	12582.83
12	14624.65	13986.20	13724.78	13575.83	13121.94
13	13600.29	13803.87	13258.57	13078.80	12901.46
14	14435.62	14128.51	14072.92	13550.51	13275.92
15	15254.11	14660.60	14369.44	14318.81	13812.91
16	15995.43	15373.08	14811.58	14305.96	14206.29
17	14932.91	14957.26	14675.34	14174.38	13699.00
18	15554.14	15023.18	14653.43	14411.40	14106.18
19	16620.36	16053.00	15524.22	15031.46	14563.35
20	16962.31	16383.28	15843.62	15340.71	14862.97

b. Nonrated
Number of PCS Moves

YOS	5	6	7	8	9
1	11098.79	11098.79	11098.79	11098.79	11098.79
2	11738.65	11738.65	11738.65	11738.65	11738.65
3	12402.07	12402.07	12303.80	12105.83	11977.05
4	12370.42	11928.69	11757.36	11786.51	11808.42
5	11919.43	11978.61	12023.19	12053.00	11756.54
6	12468.00	12529.91	12266.83	12012.61	12064.78
7	12619.58	12453.74	12091.09	12158.65	12023.65
8	13205.64	12566.74	12652.61	12419.39	12198.02
9	12761.93	12888.97	12705.09	12433.58	12462.41
10	12825.97	12953.65	12395.81	12495.97	12002.35
11	13428.31	12842.08	12977.95	12465.28	12566.01
12	14204.30	13584.20	13330.30	13185.62	12744.78
13	13572.54	13775.70	13231.52	13052.11	12875.14
14	14008.61	13710.58	13656.64	13149.69	12883.22
15	14597.03	14029.08	13750.47	13702.02	13217.91
16	15407.03	14807.57	14266.72	13779.71	13683.70
17	14964.62	14989.02	14706.51	14204.48	13728.09
18	15522.84	14992.94	14623.94	14382.40	14077.79
19	15550.95	15020.10	14525.34	14064.28	13626.29
20	16031.35	15484.10	14974.05	14498.75	14047.23

The second branch is treated in the same manner as the first branch. The second probability equation involves part-time work rather than full-time work. Probability tables for part-time work will not be constructed since the probability that the spouse will work part-time is simply 1 minus the probability that she will work full-time. A median income was calculated for spouse part-time work in the CONUS because the sample size was not large enough to develop a good wage equation. The median income for spouse part-time work in the CONUS is $106.00. The expected value of spouse income for part-time work in the CONUS is calculated in the same manner as the expected value for full-time work. This completes the second branch of the diagram in Figure 1.

Probability of Working Overseas. The probability of a spouse working overseas is computed in the same manner as it was for CONUS. The same variables are used to calculate the probability. Parameter estimates, Chi-square values, and levels of significance for wives working overseas are presented in Table 24 on the next page (5:9).

All the variables have positive coefficients except for SBOONIES, LESS15, KIDS, and MILINC. All the variables are significant with the exceptions of OVERSEAS, SBOONIES, KIDS, HUSBAND, MCIVERNS, and MNONWAGE.

Table 24
Maximum Likelihood Logit Equation
AF Officer Wives Working - Overseas

Variable	Parameter Estimate	Chi-Square	Prob
INTERCEPT	-4.907090	41.21	.0001
SAGE	0.039874	9.76	.0018
SSCHOOL	0.240546	47.24	.0001
OVERSEAS	0.027127	1.65	.1985
SBOONIES	-0.055697	0.06	.8056
BLACK	1.001600	14.54	.0001
SMONTHS	0.019111	17.44	.0001
MTOTDEBT	0.133412	13.48	.0002
LESS15	-0.206083	3.83	.0504
KIDS	-0.145992	2.11	.1466
HUSBAND	0.307544	0.41	.5213
MILINC	-0.000041	21.85	.0001
MCIVERNS	0.000034	0.84	.3582
MNONWAGE	0.000020	1.88	.1708

The same methodology is used for determining the probability of working overseas. The product of the parameter estimates and the mean values for each variable are added together for each year of service, and the sums are used to compute the probabilities of working. The probabilities of working overseas are displayed in Table 25. Once again, the number of PCS moves during a 20 year career is varied between 5 and 9 moves.

In the case of working overseas, the probabilities of working for the wives of rated officers are lower than the probabilities of working for the wives of nonrated officers. For both rated and nonrated, the probabilities of working tend to be lower than they were for the CONUS. The 20 year average probabilities for both rated and nonrated are shown in Table 26.

Table 25
Probability of AF Officer Wives Working - Overseas

a. Rated
Number of PCS Moves

YOS	5	6	7	8	9
1	.412295	.412295	.412295	.412295	.412295
2	.607294	.607294	.607294	.607294	.607294
3	.614909	.614909	.592817	.545208	.520238
4	.624752	.500035	.465055	.484115	.498443
5	.429104	.466894	.495512	.514619	.456603
6	.468576	.506756	.401746	.412123	.444871
7	.512784	.487308	.413338	.455571	.446108
8	.518988	.369221	.419375	.391739	.369221
9	.335910	.407141	.392619	.361951	.396805
10	.351731	.424173	.321864	.378299	.305411
11	.406640	.302265	.374807	.302265	.357073
12	.534240	.420313	.409103	.420313	.370861
13	.291348	.394083	.319718	.328088	.336568
14	.375726	.363850	.407586	.349236	.344906
15	.415643	.343787	.342352	.388089	.343787
16	.480052	.404774	.350932	.316948	.354204
17	.281908	.359329	.365216	.330553	.301648
18	.414037	.377496	.376748	.400199	.407100
19	.467173	.429379	.401541	.383317	.369858
20	.508106	.469921	.441488	.422731	.408806

b. Nonrated
Number of PCS Moves

YOS	5	6	7	8	9
1	.454031	.454031	.454031	.454031	.454031
2	.537007	.537007	.537007	.537007	.537007
3	.581472	.581472	.558838	.510537	.485459
4	.596917	.470785	.436067	.454948	.469198
5	.400987	.438201	.466600	.485665	.428035
6	.431706	.469537	.366509	.376548	.408433
7	.479075	.453715	.381054	.422363	.413067
8	.525404	.375229	.425648	.397883	.375229
9	.362832	.436024	.421204	.389735	.425480
10	.416988	.492657	.384870	.445101	.366939
11	.434354	.326782	.401820	.326782	.383592
12	.522135	.408525	.397414	.408525	.359600
13	.342009	.451233	.372717	.381696	.390756
14	.357732	.346109	.389017	.331837	.327613
15	.483579	.408183	.406645	.455029	.408183
16	.488712	.413156	.358871	.324503	.362176
17	.380833	.467726	.474074	.436179	.403606
18	.371701	.336749	.336038	.358412	.365031
19	.486498	.448457	.420292	.401788	.388089
20	.577410	.539732	.511147	.492039	.477720

Table 26
Probability of
AF Officer Wives Working - O/S
Rated vs Nonrated (20 yr avg)

Number of PCS Moves

Category	5	6	7	8	9
Rated	.452561	.433061	.415570	.410248	.402605
Nonrated	.461569	.442766	.424993	.419530	.411462

Probability of Working Full-time (O/S). The last probabilities that need to be calculated are the probabilities of the spouse working full-time overseas. Parameter estimates, Chi-square values, and levels of significance are presented in Table 27 (5:10).

Table 27
Maximum Likelihood Logit Equation
AF Officer Wives Working Full-time - Overseas

Variable	Parameter Estimate	Chi-Square	Prob
INTERCEPT	-1.979150	2.89	.0892
SAGE	0.019905	1.02	.3123
SSCHOOL	0.154497	9.05	.0026
OVERSEAS	-0.030893	0.94	.3332
SBOONIES	0.064783	0.03	.8519
BLACK	0.638407	3.38	.0659
SMONTHS	0.011756	2.84	.0917
MTOTDEBT	0.135327	6.55	.0105
LESS15	-0.225603	1.91	.1671
KIDS	-0.074205	0.23	.6314
HUSBAND	-0.103391	0.02	.8892
MILINC	-0.000042	8.44	.0037
MCIVERNS	0.000013	1.93	.1651
MMONWAGE	0.000050	2.93	.0869

With the exception of OVERSEAS, LESS15, KIDS, HUSBAND, and MILINC, all the coefficients have positive signs. SAGE, OVERSEAS, SBOONIES, LESS15, KIDS, HUSBAND, and MCIVERNS are all insignificant. The probabilities are displayed in the

tables below and on the next page. These probabilities represent the probability of working overseas times the probability of working full-time if working overseas. A comparison of rated and nonrated probabilities is shown in Table 29.

Table 28
Probability of AF Officer Wives Working Full-time - O/S

a. Rated
Number of PCS Moves

YOS	5	6	7	8	9
1	.248066	.248066	.248066	.248066	.248066
2	.451073	.451073	.451073	.451073	.451073
3	.444501	.444501	.421724	.374195	.350091
4	.442308	.319769	.288083	.305206	.318302
5	.250411	.283007	.308604	.326135	.273995
6	.280972	.315154	.224564	.233038	.260467
7	.316068	.293115	.230146	.265433	.257373
8	.320662	.194348	.234157	.211911	.194348
9	.157276	.209686	.198567	.175814	.201749
10	.168288	.222811	.147427	.187643	.136346
11	.206142	.132085	.182322	.132085	.169518
12	.316360	.219793	.211040	.219793	.182173
13	.118142	.187056	.136012	.141454	.147048
14	.173310	.165011	.196334	.155010	.152091
15	.199376	.148932	.147982	.179363	.148932
16	.249665	.191561	.153848	.131683	.156049
17	.107306	.155720	.159674	.136946	.119014
18	.206605	.179533	.178994	.196184	.201355
19	.254825	.224197	.202611	.188925	.179044
20	.266736	.235690	.213674	.199653	.189499

Table 28 (Cont.)
Probability of AF Officer Wives Working Full-time - O/S

b. Nonrated
Number of PCS Moves

YOS	5	6	7	8	9
1	.292085	.292085	.292085	.292085	.292085
2	.367165	.367165	.367165	.367165	.367165
3	.410008	.410008	.387394	.340690	.317260
4	.413052	.292709	.262226	.278666	.291292
5	.231992	.263456	.288334	.305458	.254732
6	.247203	.279554	.194748	.202552	.227998
7	.279348	.257635	.199046	.231699	.224200
8	.329021	.200836	.241386	.218745	.200836
9	.185907	.243722	.231578	.206527	.235059
10	.226340	.290082	.201051	.249338	.187390
11	.230166	.150234	.204703	.150234	.190923
12	.308400	.212989	.204387	.212989	.176077
13	.157775	.239826	.179557	.186116	.192822
14	.166075	.157993	.188552	.148269	.145433
15	.272888	.211357	.210164	.248880	.211357
16	.261059	.201361	.162343	.139300	.164626
17	.188913	.257506	.262832	.231680	.206120
18	.165534	.142218	.141758	.156511	.160981
19	.254651	.224239	.202774	.189150	.179306
20	.345149	.310361	.285101	.268741	.256752

Table 29
Probability of
AF Officer Wives Working Full-time - O/S
Rated vs Nonrated (20 yr avg)

Number of PCS Moves

Category	5	6	7	8	9
Rated	.258905	.241056	.226745	.222981	.216827
Nonrated	.266637	.250267	.235359	.231240	.224121

Median incomes are used for both full-time and part-time work overseas because the sample sizes were too small to develop good wage equations. The median income for full-time work overseas is $256.00 and the median income for part-time work overseas is $123.00. The third and fourth branches of the diagram in Figure 1 on page 25 can now be completed. The expected value of spouse income for full-

time and part-time work overseas can also be calculated as before. The percent of spouses living overseas is 1 minus the percent of spouses living in the CONUS (12.23176% for spouses of rated officers and 10.62272% for spouses of nonrated officers).

Expected Value of Spouse Earnings. The total expected value of spouse earnings is the sum of the expected values for the CONUS and the expected values for overseas. The tables that appear next present the expected value of total spouse earnings.

Table 30
Expected Value of AF Officer Wives Earnings ($)

a. Rated
Number of PCS Moves

YOS	5	6	7	8	9
1	3740.86	3740.86	3740.86	3740.86	3740.86
2	5909.30	5909.30	5909.30	5909.30	5909.30
3	5984.63	5984.63	5732.44	5212.98	4943.43
4	5952.59	4620.78	4264.58	4442.50	4577.68
5	4089.83	4449.17	4726.50	4914.54	4304.90
6	4407.33	4774.33	3767.34	3812.51	4110.60
7	4768.15	4494.48	3762.10	4146.63	4036.50
8	4530.64	3129.03	3558.22	3294.61	3081.78
9	2919.49	3529.42	3381.65	3093.48	3383.02
10	3018.27	3643.74	2728.15	3197.23	2558.02
11	3466.74	2550.15	3146.52	2515.33	2956.26
12	5317.82	4084.83	3937.73	4015.45	3500.86
13	2562.38	3441.22	2761.73	2811.41	2861.28
14	3517.34	3372.82	3752.95	3174.98	3105.52
15	3973.86	3241.94	3195.87	3593.51	3144.53
16	4635.98	3822.65	3266.03	2915.44	3225.70
17	2578.17	3247.14	3267.23	2920.50	2637.65
18	4329.72	3888.53	3826.47	4010.63	4026.21
19	5142.20	4638.74	4266.08	4007.88	3807.32
20	5686.14	5147.06	4744.59	4463.04	4242.77

Table 30 (cont.)
Expected Value of AF Officer Wives Earnings ($)

b. Nonrated
Number of PCS Moves

YOS	5	6	7	8	9
1	3978.93	3978.93	3978.93	3978.93	3978.93
2	5123.09	5123.09	5123.09	5123.09	5123.09
3	5678.29	5678.29	5430.67	4922.87	4660.78
4	5677.65	4398.28	4057.47	4227.55	4356.89
5	3720.77	4052.46	4309.19	4483.65	3920.94
6	3933.49	4277.88	3340.55	3385.50	3661.95
7	4261.84	4009.83	3339.01	3692.13	3592.42
8	4786.94	3344.02	3786.55	3512.39	3290.12
9	3351.60	4008.75	3846.49	3531.32	3841.23
10	3830.39	4529.46	3483.19	4016.42	3273.12
11	3923.58	2922.42	3570.57	2877.85	3357.22
12	5184.34	3985.09	3841.77	3916.93	3416.65
13	3331.79	4352.56	3554.84	3606.31	3657.54
14	3226.12	3091.67	3449.38	2909.05	2845.29
15	4905.85	4069.33	4006.72	4447.83	3928.44
16	4926.96	4082.49	3498.98	3128.01	3448.18
17	3942.24	4801.74	4808.01	4343.34	3955.14
18	3881.96	3472.71	3417.55	3591.83	3609.04
19	5426.15	4918.95	4539.64	4273.81	4065.56
20	6695.24	6122.62	5685.24	5371.39	5121.24

Impact on Military Part-time Earnings

The last component of family income that is adversely impacted by a PCS move is the part-time earnings of military members. The expected value of this income is the sum of two elements: the probability that the member has a civilian part-time job if he lives in the United States times the median part-time wage for the United States, and the probability that the member works part-time if he is assigned overseas times the median part-time income for overseas. These probability branches are diagrammed in Figure 2 on the next page (5:12).

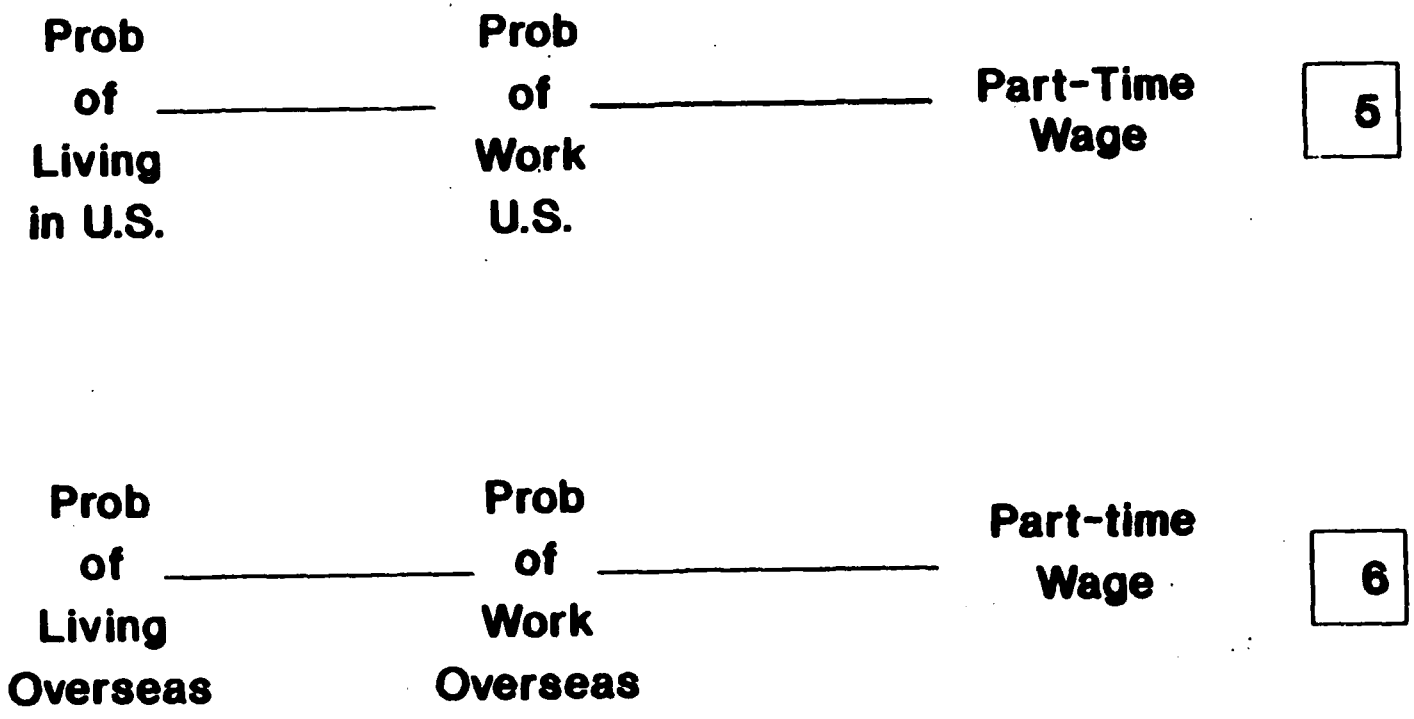


Figure 2. Expected Value: Member's Second Job Income for a Given Year

Probability of Working in the United States. Using the same regression techniques as before, eight variables have been included in the probability equation for working part-time in the CONUS. Variable names, parameter estimates, Chi-square values, and levels of significance are shown in Table 31 below (5:13).

Table 31
Maximum Likelihood Logit Equation
AF Officers Working Part-time - CONUS

Variable	Parameter Estimate	Chi-Square	Prob
INTERCEPT	-3.058480	3.21	.0731
MMONTHS	0.009920	3.95	.0468
BOONIES	0.360505	2.95	.0860
MNONWAGE	0.000023	5.83	.0158
MTOTDEBT	0.094174	5.03	.0250
MILINC	0.000019	1.51	.2194
SEPARATE	-0.114341	10.47	.0012
MRANK	-0.079964	0.41	.5195
KIDS	0.154551	4.71	.0301

MMONTHS represents the number of months that the military member has been assigned to his current location. This variable corresponds to the SMONTHS variable that was used for the spouse probability tables. Values for this variable will differ according to the number of PCS moves made during the member's career. SEPARATE is a variable which indicates whether or not the military member and his spouse are living at the same location. MRANK identifies the military rank of the member at the time he responded to the survey. All other variables have already been defined. All of the variables except SEPARATE and MRANK have positive

coefficients, indicating that the probability of working part-time increases as they increase. All variables are significant except for MILINC and MRANK.

To obtain the probability of working in the United States, the same procedure as before is followed. The parameter estimates from Table 31 are multiplied by the mean values of each variable for each year of service. Mean values are included in Appendix C. The products are then summed and the probability equation is applied. The tables below and on the next page show the probabilities of the military member working part-time in the United States.

Table 32
Probability of AF Officers Working Part-time - CONUS

a. Rated
Number of PCS Moves

YOS	5	6	7	8	9
1	.030583	.030583	.030583	.030583	.030583
2	.030959	.030959	.030959	.030959	.030959
3	.033164	.033164	.031661	.028711	.027294
4	.040838	.031646	.029491	.030649	.031545
5	.028284	.030549	.032362	.033628	.029919
6	.033135	.035774	.028893	.029526	.031582
7	.040681	.038666	.033286	.036281	.035594
8	.047378	.034942	.038814	.036653	.034942
9	.035609	.041480	.040249	.037710	.040602
10	.045149	.052507	.042248	.047785	.040671
11	.047544	.037852	.044496	.037852	.042839
12	.052776	.042065	.041109	.042065	.037941
13	.036692	.046101	.039227	.039982	.040750
14	.041128	.040097	.043955	.038843	.038475
15	.047812	.041083	.040953	.045174	.041083
16	.051428	.044214	.039447	.036548	.039730
17	.040973	.048900	.049519	.045914	.042967
18	.048820	.045264	.045193	.047456	.048134
19	.056883	.052772	.049875	.048028	.046685
20	.054644	.050686	.047898	.046120	.044829

Table 32 (cont.)
Probability of AF Officers Working Part-time - CONUS

b. Nonrated
Number of PCS Moves

YOS	5	6	7	8	9
1	.029532	.029532	.029532	.029532	.029532
2	.032820	.032820	.032820	.032820	.032820
3	.040070	.040070	.038266	.034723	.033019
4	.046033	.035715	.033293	.034594	.035602
5	.032887	.035507	.037602	.039065	.034778
6	.035749	.038588	.031183	.031865	.034078
7	.045922	.043659	.037611	.040979	.040207
8	.048397	.035703	.039657	.037451	.035703
9	.035353	.041184	.039961	.037440	.040312
10	.040752	.047429	.038122	.043143	.036694
11	.048939	.038975	.045806	.038975	.044103
12	.055790	.044496	.043488	.044496	.040144
13	.040745	.051138	.043548	.044381	.045231
14	.045642	.044503	.048764	.043118	.042711
15	.049219	.042301	.042167	.046507	.042301
16	.055251	.047528	.042420	.039311	.042723
17	.042874	.051150	.051796	.048034	.044957
18	.044708	.041439	.041373	.043454	.044077
19	.054554	.050602	.047818	.046044	.044754
20	.063370	.058820	.055610	.053563	.052074

As expected, the probability of having a part-time job is slightly higher for nonrated officers than for rated officers. Nonrated officers are more likely to have regular hours than rated officers. A comparison of the 20 year average probabilities of holding a part-time job is presented in Table 33 below.

Table 33
Probability of
AF Officers Working Part-time - CONUS
Rated vs Nonrated (20 yr avg)

Number of PCS Moves

Category	5	6	7	8	9
Rated	.042224	.040465	.039011	.038523	.037856
Nonrated	.044430	.042558	.041042	.040474	.039791

Since the number of military members working part-time is so small, a median income is used to calculate the expected value of part-time income in the United States. The median wage for officers working part-time in the CONUS is $1,950.00. The first branch of the diagram in Figure 2 on page 47 can now be completed by multiplying the probability of work in the CONUS by this median wage for each year of service. The expected value of the military member's part-time income in the United States can then be calculated by multiplying the result by the percent of military members assigned to the CONUS, which is 86.695279% for rated officers and 88.644689% for nonrated officers.

Probability of Working Overseas. The second branch of the diagram in Figure 2 refers to part-time work overseas by the military member. The work probabilities for this portion are adjusted by using the marginal difference between the percent of members working in the CONUS and the percent of members working overseas. The percent working in the CONUS is 5.181748%, and the percent working overseas is 4.232804%. As an example, the probability of work for a rated officer with 20 years of service and 5 PCS moves is estimated to be 0.054644 - (0.051817 - 0.042328) = 0.045155. The following tables show the probabilities of working part-time overseas for rated and nonrated officers.

Table 34
Probability of AF Officers Working Part-time - Overseas

a. Rated
Number of PCS Moves

YOS	5	6	7	8	9
1	.021094	.021094	.021094	.021094	.021094
2	.021469	.021469	.021469	.021469	.021469
3	.023675	.023675	.022172	.019221	.017804
4	.031349	.022157	.020002	.021159	.022056
5	.018795	.021059	.022872	.024138	.020429
6	.023645	.026284	.019404	.020037	.022093
7	.031192	.029177	.023796	.026792	.026105
8	.037888	.025452	.029325	.027164	.025452
9	.026120	.031991	.030759	.028221	.031112
10	.035659	.043018	.032759	.038296	.031182
11	.038054	.028363	.035007	.028363	.033350
12	.043286	.032575	.031620	.032575	.028452
13	.027203	.036611	.029738	.030492	.031261
14	.031638	.030607	.034465	.029354	.028985
15	.038323	.031594	.031464	.035685	.031594
16	.041938	.034724	.029958	.027058	.030241
17	.031483	.039411	.040029	.036425	.033477
18	.039331	.035775	.035703	.037967	.038644
19	.047393	.043282	.040385	.038538	.037196
20	.045155	.041197	.038408	.036631	.035339

b. Nonrated
Number of PCS Moves

YOS	5	6	7	8	9
1	.020042	.020042	.020042	.020042	.020042
2	.023331	.023331	.023331	.023331	.023331
3	.030581	.030581	.028777	.025233	.023529
4	.036543	.026226	.023803	.025104	.026112
5	.023397	.026017	.028113	.029575	.025288
6	.026260	.029098	.021694	.022375	.024589
7	.036432	.034169	.028121	.031490	.030717
8	.038907	.026214	.030167	.027961	.026214
9	.025864	.031695	.030472	.027951	.030822
10	.031262	.037940	.028633	.033654	.027204
11	.039449	.029485	.036317	.029485	.034613
12	.046301	.035007	.033999	.035007	.030655
13	.031256	.041649	.034058	.034892	.035741
14	.036152	.035014	.039274	.033629	.033221
15	.039730	.032812	.032678	.037018	.032812
16	.045762	.038038	.032931	.029821	.033234
17	.033385	.041661	.042307	.038545	.035467
18	.035219	.031949	.031884	.033965	.034588
19	.045064	.041113	.038329	.036554	.035264
20	.053881	.049331	.046121	.044073	.042584

Once again, the 20 year average probabilities are higher for nonrated officers than for rated officers. Also, the probabilities for working part-time overseas are considerably lower than the corresponding probabilities for working part-time in the United States. The 20 year averages are displayed in the table below.

Table 35
Probability of
AF Officers Working Part-time - O/S
Rated vs Nonrated (20 yr avg)

Number of PCS Moves

Category	5	6	7	8	9
Rated	.032734	.030976	.029522	.029034	.028367
Nonrated	.034941	.033069	.031553	.030985	.030301

The median annual wage for officers working part-time overseas is $2,700.00. The second branch of the diagram in Figure 2 can now be completed. The expected value of military part-time income overseas can also be calculated by multiplying the result by 13.3047% for rated officers and 11.3553% for nonrated officers. These numbers represent the percentages of officers assigned overseas in rated and nonrated specialties, respectively.

Expected Value of Military Part-time Earnings. The expected value of total military part-time earnings is the sum of the expected value for the CONUS and the expected value for overseas. The tables on the next page present the expected values of total military part-time earnings.

Table 36
Expected Value of AF Officers Part-time Earnings ($)

a. Rated
Number of PCS Moves

YOS	5	6	7	8	9
1	59.28	59.28	59.28	59.28	59.28
2	60.05	60.05	60.05	60.05	60.05
3	64.57	64.57	61.49	55.44	52.54
4	80.30	61.46	57.04	59.42	61.25
5	54.57	59.21	62.93	65.52	57.92
6	64.51	69.92	55.82	57.11	61.33
7	79.98	75.85	64.82	70.96	69.55
8	93.71	68.22	76.15	71.72	68.22
9	69.58	81.62	79.09	73.89	79.82
10	89.14	104.22	83.19	94.54	79.96
11	94.05	74.18	87.80	74.18	84.40
12	104.77	82.82	80.86	82.82	74.36
13	71.80	91.09	77.00	78.55	80.12
14	80.89	78.78	86.69	76.21	75.46
15	94.60	80.80	80.54	89.19	80.80
16	102.01	87.22	77.45	71.51	78.03
17	80.58	96.83	98.10	90.71	84.66
18	96.66	89.37	89.23	93.87	95.26
19	113.19	104.76	98.82	95.04	92.29
20	108.60	100.49	94.77	91.13	88.48

b. Nonrated
Number of PCS Moves

YOS	5	6	7	8	9
1	57.19	57.19	57.19	57.19	57.19
2	63.89	63.89	63.89	63.89	63.89
3	78.64	78.64	74.97	67.76	64.29
4	90.78	69.78	64.85	67.50	69.55
5	64.02	69.35	73.62	76.59	67.87
6	69.85	75.62	60.55	61.94	66.45
7	90.55	85.94	73.64	80.49	78.92
8	95.59	69.75	77.80	73.31	69.75
9	69.04	80.91	78.42	73.29	79.13
10	80.03	93.62	74.68	84.90	71.77
11	96.69	76.41	90.31	76.41	86.85
12	110.63	87.65	85.60	87.65	78.79
13	80.01	101.16	85.72	87.42	89.14
14	89.98	87.66	96.33	84.84	84.02
15	97.26	83.18	82.91	91.74	83.18
16	109.54	93.82	83.42	77.10	84.04
17	84.35	101.19	102.50	94.85	88.58
18	88.08	81.43	81.29	85.53	86.80
19	108.12	100.08	94.41	90.80	88.17
20	126.06	116.80	110.27	106.10	103.07

Military Income

Military income is not affected by a PCS move, but it is an important element of total family income. An equation for Air Force officer income was developed by Gill and is shown in Table 37 below (3:15).

Table 37
Equation for AF Officer Military Income

Variable	Parameter Estimate	t	Prob > t
INTERCEPT	-7654.07000	-2.394	.0167
YEAR	532.74124	8.771	.0001
MAGE	1182.83293	7.601	.0001
MAGE2	-4.70800	-2.463	.0139
OMA	99.57484	0.369	.7124
OPHD	3463.42155	5.621	.0001
OED	269.27118	2.558	.0106
MOVERSEA	-2.07012	-0.572	.5671
FLTPAY	4824.45274	24.204	.0001
PROPAY	8545.37016	9.897	.0001
ACADEMY	1596.84246	6.604	.0001

YEAR represents year of service for the member. MAGE is the member's age; MAGE2 is his age squared. OMA identifies officers with master's degrees, while OPHD identifies those with doctorate degrees. OED represents the education level of the member. MOVERSEA is the number of months overseas. FLTPAY and PROPAY are incentive payments to members for hazardous or special duties. ACADEMY is a variable which identifies graduates from a service academy. All variables have positive coefficients except for MAGE2 and MOVERSEA. All but OMA and MOVERSEA are significant.

In order to obtain the expected military income, the means for rated and nonrated officers for each of the

variables are multiplied by the parameter estimates in Table 37 for each year of service. These means are included in Appendix D. The results are then summed for each year. Table 38 below presents the military earnings for both rated and nonrated officers for 20 years of service by year.

Table 38
AF Officers Military Earnings ($)

YOS	Rated	Nonrated
1	26559.54	25917.25
2	27759.93	26285.70
3	29214.63	27057.67
4	30907.29	29003.06
5	32390.15	29083.41
6	34060.25	31518.94
7	35628.17	32376.74
8	37229.04	34538.82
9	38154.77	35190.83
10	39814.56	36779.95
11	40891.34	38892.88
12	42384.32	40299.14
13	43529.23	41381.05
14	44946.16	43195.63
15	46333.73	43980.18
16	47903.44	45485.85
17	49115.79	46205.57
18	50417.41	47825.72
19	51497.03	49605.58
20	52547.14	50483.37

The next chapter will analyze the effects of PCS moves on total family income by summing the impacts on spouse earnings and officer part-time earnings. A sensitivity analysis will also be presented for comparison purposes.

V. Analysis

The major components of family income that are affected by a PCS move have now been addressed. In order to assess the overall impact, the individual effects on these components must be added together. In this chapter, the total impact of varying numbers of PCS moves on Air Force officer family income will be discussed for both rated and nonrated officers. Later, a sensitivity analysis will be performed in which it will be assumed that the spouse always works full-time. Finally, a sensitivity analysis will be conducted in which it will be assumed that the spouse always works part-time.

Impact on Family Income

To obtain the impact of a PCS move on total family income, the impacts on expected spouse earnings and expected military part-time earnings must be added together. The unreimbursed moving costs must then be subtracted from these results. Finally, military income must be added in order to obtain the total expected family income. Table 39 on the next page shows the expected family income for rated officers. The number of PCS moves during a 20 year career is once again varied between 5 moves and 9 moves.

Table 39
Expected Value of AF Officer Family Income ($)
Rated

Number of PCS Moves

YOS	5	6	7	8	9
1	28394.14	28394.14	28394.14	28394.14	28394.14
2	33729.28	33729.28	33729.28	33729.28	33729.28
3	35263.83	35263.83	33043.03	32517.52	32245.06
4	36940.18	33623.99	35228.91	35409.20	35546.22
5	34569.02	36898.53	37179.57	37370.21	34787.44
6	38532.09	38904.49	35917.87	35964.34	38232.18
7	40476.29	38232.96	39455.09	39845.76	37768.69
8	41853.39	40426.29	40863.41	38629.84	40379.03
9	39178.31	41765.80	39649.98	41322.13	39652.07
10	42921.97	43562.51	42625.90	43106.33	42452.53
11	44452.12	41550.13	44125.66	41515.31	43932.00
12	47806.91	46551.96	44437.37	46482.58	43994.01
13	44197.88	47061.53	46367.96	44453.65	46470.63
14	48544.79	46432.22	48785.80	48197.35	46161.60
15	50402.18	49656.47	47644.60	50016.42	49559.06
16	52641.42	51813.30	51246.92	48924.85	49241.63
17	49809.00	50494.22	52481.11	52126.99	51838.10
18	54843.79	54395.31	52367.57	52556.37	52573.34
19	56752.42	56240.53	55861.93	55599.94	55396.63
20	58341.87	57794.69	57386.50	57101.30	56878.39
SUM	879650.97	872792.28	866792.68	863263.62	859232.10
AVG	43982.54	43639.61	43339.63	43163.18	42961.60
NPV	634465.20	629487.51	625028.53	622625.47	619622.43
ANN	42646.02	42311.44	42011.73	41850.21	41648.36

In addition to the yearly income figures, the table above also shows the sum, average, net present value (NPV), and annuity (ANN) value (the present value sum of which is equal to NPV) for each number of moves. The net present value gradually decreases as the number of moves increases. The annuity, which is defined as a series of equal amounts to be received at the end of equal time intervals, is small for two reasons (14:1016). First, over half of the spouses do not work; of those that do work, only about 40% work full-

time. Therefore, the decrease in the annuity with increased mobility is low because nonworking spouses are not affected and the financial penalty for part-time workers is relatively small in dollar terms. Second, the cumulative impact of mobility becomes greater over time while the present value (PV) factors become smaller (when examined at the beginning of a military career).

The table below shows the same information for nonrated officer families.

Table 40
Expected Value of AF Officer Family Income ($)
Nonrated

	Number of PCS Moves				
YOS	5	6	7	8	9
1	28006.08	28006.08	28006.08	28006.08	28006.08
2	31472.68	31472.68	31472.68	31472.68	31472.68
3	32814.60	32814.60	30616.02	30101.01	29835.45
4	34771.48	31523.82	33125.37	33298.11	33429.49
5	30920.92	33205.22	33466.22	33643.65	31124.93
6	35522.28	35872.44	32972.76	33019.09	35247.33
7	36729.13	34525.22	35789.38	36149.36	34100.79
8	39421.34	37952.59	38403.16	36177.23	37898.69
9	36664.18	39280.48	37168.45	38795.44	37163.90
10	40690.36	41403.02	40337.81	40881.26	40124.83
11	42913.15	39944.42	42553.76	39899.85	42336.95
12	45594.10	44371.87	42279.22	44303.72	41847.29
13	42845.56	45834.77	45021.60	43127.48	45127.72
14	46511.73	44427.67	46741.34	46189.52	44177.64
15	48983.29	48132.69	46122.52	48519.75	47991.80
16	50522.35	49662.16	49068.25	46743.76	47070.78
17	48284.86	49161.21	51116.08	50643.75	50249.29
18	51795.76	51379.85	49377.28	49555.79	49574.27
19	55139.84	54624.60	54239.63	53970.18	53759.31
20	57304.67	56722.79	56278.87	55960.86	55707.68
SUM	836908.45	830318.27	824156.57	820458.65	816246.99
AVG	41845.42	41515.91	41207.82	41022.93	40812.34
NPV	602205.05	597410.96	592864.78	590353.23	587246.73
ANN	40477.63	40155.40	39849.82	39681.01	39472.20

As expected, the net present values and the annuities again decrease as the number of moves increase. The annuity values are lower for nonrated officer families than for rated officer families because the military incomes for nonrated officers are generally lower than for rated officers.

Sensitivity Analysis

A sensitivity analysis shows the effect of changing one or more input factors. The analysis that has been presented thusfar is based on probabilities of working. It might be interesting to see what the expected family income would be if the spouse always worked full-time or always worked part-time. In making these calculations, it will be assumed that in the year of a move, the spouse loses three months of work time.

Spouse Working Full-time. If it is assumed that the spouse always works full-time, then the probability of working and the probability of working full-time are both equal to one. Table 41 on the next page shows the average, net present value, and annuity figures for total family income for rated and nonrated officer families under this assumption.

Table 41
Expected Value of AF Officer Family Income ($)
Spouse Working Full-time

a. Rated
Number of PCS Moves

	5	6	7	8	9
AVG	52686.02	52197.49	51716.49	51286.81	50830.88
NPV	759748.12	752681.82	745776.44	739907.03	733255.75
ANN	51067.01	50592.04	50127.89	49733.37	49286.30

b. Nonrated
Number of PCS Moves

	5	6	7	8	9
AVG	50060.34	49579.55	49105.58	48672.16	48240.48
NPV	721171.76	714205.64	707374.90	701445.59	695163.06
ANN	48474.07	48005.84	47546.70	47148.16	46725.88

Spouse Working Part-time. A similar analysis can be made under the assumption that the spouse always works part-time instead of full-time. In this case, the probability of working remains equal to one, but the probability of working full-time is equal to zero while the probability of working part-time is equal to one. Table 42 below and on the next page shows the new information assuming that the spouse always works part-time.

Table 42
Expected Value of AF Officer Family Income ($)
Spouse Working Part-time

a. Rated
Number of PCS Moves

	5	6	7	8	9
AVG	44924.82	44752.69	44581.18	44411.66	44241.76
NPV	647566.97	644903.24	642299.48	639906.32	637276.89
ANN	43526.67	43347.63	43172.61	43011.76	42835.02

Table 42 (cont.)
Expected Value of AF Officer Family Income ($)
Spouse Working Part-time

b. Nonrated
Number of PCS Moves

	5	6	7	8	9
AVG	42611.60	42440.35	42269.82	42101.23	41932.40
NPV	613502.66	610852.58	608263.74	605883.90	603270.88
AMM	41237.02	41058.89	40884.88	40724.92	40549.28

The charts below and on the next page show the average expected family income according to the calculated probabilities of working. They also show what the average expected family income would be under both of the assumptions discussed above.

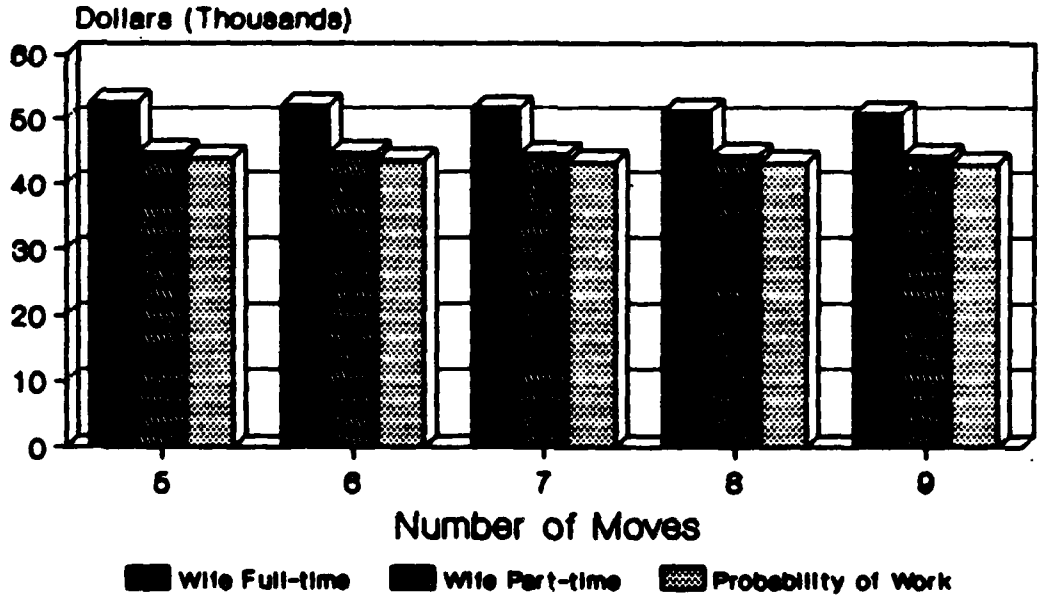


Figure 3
Average Expected Family Income
Rated

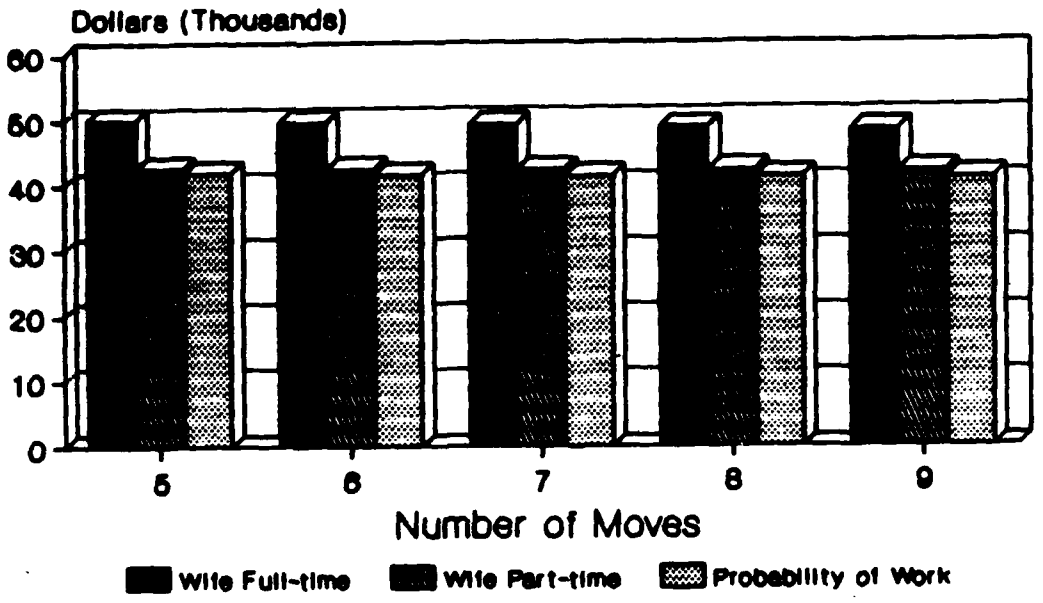


Figure 4
Average Expected Family Income
Nonrated

The next chapter will summarize the results of this study and draw a comparison between rated and nonrated officer families in terms of the impact of PCS moves on family income.

VI. Conclusions and Recommendations

Conclusions

It has been shown that Air Force officer family income is affected by the number of PCS moves that the family makes during a 20 year career. Three components of a PCS move that impact expected income have been examined in detail: unreimbursed moving costs, spouse earnings, and military part-time earnings. It was shown in Chapter III that the average unreimbursed moving expense for Air Force officer families was $1,840.98 for CONUS to CONUS moves, $2,743.41 for CONUS to overseas moves, and $2,811.00 for overseas to CONUS moves. Expected spouse earnings for those spouses that work full-time (from Chapter IV) range from $14,047.23 for the spouse of a nonrated officer who has made 9 PCS moves and has been in the service for 20 years to $16,031.35 for the spouse of a nonrated officer who has made 5 PCS moves during his 20 year career. The comparable numbers for the spouses of rated officers are $14,862.97 and $16,962.31, respectively. Air Force officer part-time earnings are relatively low in comparison to spouse earnings since so few officers have civilian part-time jobs. In fact, the highest expected value for annual part-time earnings was only $126.06, and in most cases, the expected value was well below $100.00.

Total family income figures were presented in Chapter V. These expected values were determined by adding the military income, the expected spouse earnings, and the expected military part-time earnings together and then subtracting out any unreimbursed moving costs. The expected family income (an average for all families) ranges from $40,812.34 for a nonrated officer family that will make 9 PCS moves to $43,982.54 for a rated officer family that will make only 5 PCS moves. It is interesting to note that, in general, the expected spouse earnings are greater for the spouses of nonrated officers than rated officers; however, the higher military incomes for rated officers more than offset this difference. As a result, rated officer families have a higher expected family income, regardless of the number of PCS moves made during a 20 year career. A comparison of family incomes between rated and nonrated officers is shown in the table below.

Table 43
PV Annuity of Air Force Officer Family Income ($)

Category	Number of PCS Moves				
	5	6	7	8	9
Rated	42646.02	42311.44	42011.73	41850.21	41648.36
Nonrated	40477.63	40155.40	39849.82	39681.01	39472.20

Results of this analysis also indicate that the number of PCS moves made by the spouse over a 20 year career does, in fact, have an effect on the total family income.

Both rated and nonrated officers make an average of approximately 6.5 PCS moves during a 20 year career. This means, then, that the expected total family income for a rated officer and his family at the current mobility rate, expressed in terms of a present value annuity, is $42,161.58. For a nonrated officer and his family, this value is $40,002.61. Since the mobility rate is roughly the same for rated and nonrated officers, this difference in expected family income can be attributed to other factors.

Recommendations

As a result of this study, it is recommended that further analysis be performed on this subject. For this thesis, several assumptions had to be made concerning part-time wages. The survey data that was used did not include information on hours worked per week or wage rates. As a result, median incomes had to be calculated and used for part-time income figures instead of using actual data. Future studies might be able to better estimate part-time income by finding more complete and accurate information.

In addition, no information was available for this study on the labor force history of the spouses. Most importantly, there was no information available on the length of time that a spouse was out of the labor force as a result of past PCS moves.

For analytical convenience, military members with military spouses were excluded from this study. An analysis

of military couples could possibly reveal numerous issues that might merit further examination. Finally, this analysis only dealt with twenty years of military service. The lifetime impact of mobility was not addressed. Future studies might consider the impact of mobility and military service on the earnings from a second career (after retirement from the military).

Appendix A: Mean Values Used to Estimate the Probability of AF Officer Wives Working

Rated

BLACK	HUSBAND	INTERCEPT	KIDS	LESS15	MCIVERNS	MILINC
.0064	.9678	3.349	0.25	0.15	0.00	14080.25
			0.30	0.20	0.00	15101.30
			0.55	0.41	0.00	16854.32
			0.70	0.60	800.00	21789.50
			0.74	0.65	0.00	24222.78
			0.77	0.64	113.64	26038.77
			1.18	1.09	0.00	26284.41
			1.55	1.34	10.34	27598.72
			1.70	1.57	578.26	30172.78
			2.23	2.00	40.00	30962.77
			2.03	1.79	0.00	32375.93
			1.57	1.35	0.00	32414.22
			2.05	2.00	0.00	34327.26
			1.83	1.71	327.71	35136.83
			2.06	2.03	128.13	35606.78
			2.00	1.89	1466.67	36878.15
			2.50	2.21	40.63	37884.92
			2.00	1.53	35.29	40237.65
			2.10	1.33	0.00	40951.48
			2.10	1.10	0.00	38677.50

MNONWAGE	MTOTDEBT	OVERSEAS	SAGE	SBOOMIES	SSCHOOL
497.50	5.25	0.00	22	0.00	15.75
1039.50	5.00	0.00	23	0.10	
276.05	4.41	0.23	24	0.14	
530.33	4.40	0.23	25	0.23	
344.96	4.39	0.39	26	0.17	
1187.50	4.00	0.50	27	0.09	
510.73	4.59	0.55	28	0.23	
2795.52	3.66	0.48	29	0.14	
1682.39	4.00	1.43	30	0.09	
1712.70	4.27	0.77	31	0.07	
2237.79	3.76	1.03	32	0.10	
1704.19	4.43	1.41	33	0.11	
1090.68	3.89	1.00	34	0.11	
1909.63	3.91	1.89	35	0.09	
1567.59	4.19	1.69	36	0.06	
2621.26	3.78	1.52	37	0.04	
3144.08	3.75	2.08	38	0.04	
4874.18	4.88	2.53	39	0.12	
5986.76	4.52	1.90	40	0.00	
1415.00	3.30	2.00	41	0.10	

Appendix A (continued)

Nonrated

BLACK	HUSBAND	INTERCEPT	KIDS	LESS15	MCIVERNS	MILINC
.0342	.9573	3.349	0.39	0.24	147.06	15529.00
			0.45	0.34	0.00	17931.92
			0.80	0.60	10.00	19288.83
			0.96	0.81	76.92	22353.77
			1.30	1.04	0.00	22910.09
			1.32	0.97	756.76	24693.54
			1.64	1.49	742.34	25259.51
			1.46	1.26	227.76	26647.24
			1.60	1.44	235.87	26665.09
			1.68	1.41	117.65	27011.18
			1.89	1.79	0.66	29882.89
			1.83	1.72	57.45	29837.83
			1.94	1.75	203.13	31563.50
			2.33	2.21	178.85	30940.79
			1.56	1.38	89.51	33319.40
			2.10	1.86	29.76	33478.62
			1.94	1.67	138.46	32973.40
			2.21	1.74	37.74	36287.04
			2.09	1.45	972.53	36664.68
			1.83	1.30	110.63	38047.18

MNONWAGE	MTOTDEBT	OVERSEAS	SAGE	SBOONIES	SSCHOOL
854.12	4.91	0.00	23	0.09	15.235
206.58	4.66	0.00	24	0.11	
696.86	5.09	0.09	26	0.14	
670.58	4.92	0.42	27	0.12	
1374.35	4.74	0.17	28	0.00	
1009.35	3.92	0.43	29	0.05	
1100.34	4.43	1.40	30	0.11	
3112.89	3.70	0.63	31	0.02	
1729.07	4.16	0.87	32	0.04	
1271.59	4.09	0.74	33	0.12	
1389.05	4.21	1.18	34	0.16	
1459.30	4.70	1.09	35	0.02	
1652.97	4.50	1.66	36	0.03	
1750.02	4.00	1.17	37	0.12	
3815.53	4.09	1.71	38	0.11	
1554.88	3.98	1.64	39	0.10	
4381.29	4.33	2.23	40	0.12	
1921.53	3.87	2.19	41	0.06	
2050.58	4.57	2.72	42	0.02	
5159.53	4.78	3.58	43	0.03	

Appendix B: Mean Values Used to Estimate AF Officer Spouse Income

Rated

AGE	ASIAN	BLACK	EDUCATION	INTERCEPT
22	0.013	.0064	16	3.903

LT12	SBOONIES	SKILL	OVERSEAS
0.25	0.00	0.25	0.00
0.30	0.10	0.20	0.00
0.32	0.14	0.32	0.23
0.17	0.23	0.33	0.23
0.09	0.17	0.39	0.39
0.14	0.09	0.23	0.50
0.05	0.23	0.23	0.55
0.07	0.14	0.14	0.48
0.00	0.09	0.17	1.43
0.00	0.07	0.17	0.77
0.00	0.10	0.03	1.03
0.00	0.11	0.27	1.41
0.00	0.11	0.05	1.00
0.00	0.09	0.20	1.89
0.00	0.06	0.28	1.69
0.00	0.04	0.33	1.52
0.00	0.04	0.17	2.08
0.00	0.12	0.24	2.53
0.00	0.00	0.33	1.90
0.00	0.10	0.30	2.00

Appendix B (continued)

Nonrated

AGE	ASIAN	BLACK	EDUCATION	INTERCEPT
23	.0269	.0342	15	3.903

LT12	SBOONIES	SKILL	OVERSEAS
0.32	0.09	0.24	0.00
0.37	0.11	0.34	0.00
0.17	0.14	0.46	0.09
0.04	0.12	0.31	0.42
0.04	0.00	0.22	0.17
0.00	0.05	0.30	0.43
0.04	0.11	0.26	1.40
0.02	0.02	0.26	0.63
0.00	0.04	0.24	0.87
0.03	0.12	0.12	0.74
0.00	0.16	0.21	1.18
0.00	0.02	0.28	1.09
0.00	0.03	0.22	1.66
0.00	0.12	0.21	1.17
0.00	0.11	0.27	1.71
0.02	0.10	0.36	1.64
0.00	0.12	0.38	2.23
0.00	0.06	0.38	2.19
0.00	0.02	0.25	2.72
0.00	0.03	0.28	3.58

Appendix C: Mean Values Used to Estimate the Probability of AF Officers Working Part-time

Rated

BOONIES	INTERCEPT	KIDS	MILINC
0.00	3.058	0.25	22080.25
0.20		0.30	15101.30
0.23		0.55	16854.32
0.23		0.70	21789.50
0.17		0.74	24222.78
0.27		0.77	26038.77
0.18		1.18	26284.41
0.21		1.55	27598.72
0.17		1.70	30172.78
0.20		2.23	30962.77
0.14		2.03	32375.93
0.16		1.57	32414.22
0.16		2.05	34327.26
0.14		1.83	35136.83
0.09		2.06	35606.78
0.00		2.00	36878.15
0.13		2.50	37884.92
0.06		2.00	40237.65
0.10		2.10	40951.48
0.30		2.10	38677.50

MNONWAGE	MRANK	MTOTDEBT	SEPARATE
497.50	14.50	5.25	2.942
1039.50	14.10	5.00	
276.05	14.82	4.41	
530.33	15.13	4.40	
344.96	15.74	4.39	
1187.50	15.91	4.00	
510.73	15.68	4.59	
2795.52	15.90	3.66	
1682.39	15.96	4.00	
1712.70	16.03	4.27	
2237.79	16.07	3.76	
1704.19	16.03	4.43	
1090.68	16.89	3.89	
1909.63	16.83	3.91	
1567.59	16.91	4.19	
2621.26	17.04	3.78	
3144.08	17.46	3.75	
4874.18	17.76	4.88	
5986.76	17.67	4.52	
1415.00	17.30	3.30	

Appendix C (continued)

Nonrated

BOOMIES	INTERCEPT	KIDS	MILINC
0.06	3.058	0.39	15529.00
0.16		0.45	17931.92
0.17		0.80	19288.83
0.08		0.96	22353.77
0.04		1.30	22910.09
0.08		1.32	24693.54
0.17		1.64	25259.51
0.09		1.46	26647.24
0.09		1.60	26665.09
0.18		1.68	27011.18
0.13		1.89	29882.89
0.09		1.83	29837.83
0.16		1.94	31563.50
0.12		2.33	30940.79
0.11		1.56	33319.40
0.10		2.10	33478.62
0.19		1.94	32973.40
0.09		2.21	36287.04
0.15		2.09	36664.68
0.08		1.83	38047.18

MNONWAGE	MRANK	MTOTDEBT	SEPARATE
854.12	14.15	4.91	2.178
206.58	14.58	4.66	
696.86	15.17	5.09	
670.58	15.27	4.92	
1374.35	15.78	4.74	
1009.35	15.76	3.92	
1100.34	15.77	4.43	
3112.89	15.91	3.70	
1729.07	15.96	4.16	
1271.59	16.03	4.09	
1389.05	16.16	4.21	
1459.30	16.21	4.70	
1652.97	16.63	4.50	
1750.02	16.50	4.00	
3815.53	16.73	4.09	
1554.88	16.95	3.98	
4381.29	17.02	4.33	
1921.53	17.57	3.87	
2050.58	17.43	4.57	
5159.53	17.58	4.78	

Appendix D: Mean Values Used to Estimate AF Officers Military Income

Rated

MAGE	OMA	OPHD	OED	MOVERSEA	FLTPAY	PROPAY	ACADEMY
22	.469	0.00	16.92	0.20	1.00	0.00	0.33
23				0.25	1.00		0.13
24				3.95	1.00		0.11
25				3.86	1.00		0.24
26				8.00	1.00		0.25
27				9.71	1.00		0.38
28				9.95	1.00		0.45
29				12.86	1.00		0.55
30				21.10	1.00		0.24
31				17.31	1.00		0.38
32				20.62	1.00		0.17
33				26.60	1.00		0.23
34				18.76	1.00		0.06
35				29.24	1.00		0.09
36				33.93	1.00		0.10
37				38.65	1.00		0.23
38				41.09	0.96		0.26
39				58.88	1.00		0.13
40				46.75	0.95		0.10
41				44.00	0.88		0.13

MAGE	OMA	OPHD	OED	MOVERSEA	FLTPAY	PROPAY	ACADEMY
23	0.37	0.17	17.64	0.04	0.10	0.16	0.03
24				0.10	0.10	0.15	0.03
25				0.71	0.05	0.08	0.11
26				4.54	0.18	0.07	0.07
27				4.04	0.00	0.00	0.12
28				8.79	0.05	0.08	0.16
29				12.20	0.02	0.04	0.10
30				13.72	0.09	0.08	0.13
31				17.17	0.06	0.02	0.06
32				12.37	0.05	0.05	0.03
33				18.26	0.05	0.13	0.05
34				21.27	0.16	0.06	0.10
35				30.38	0.06	0.09	0.06
36				26.30	0.23	0.04	0.08
37				27.90	0.10	0.06	0.00
38				30.70	0.09	0.07	0.07
39				40.30	0.11	0.00	0.00
40				35.57	0.11	0.02	0.06
41				53.19	0.20	0.02	0.09
42				54.45	0.14	0.00	0.10

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The purpose of this study was to examine the effects of various numbers of Permanent Change of Station (PCS) moves on Air Force officer family income. The analysis also included a comparison between rated and nonrated officers. Only male military members with civilian spouses were considered, and the study was limited to military members with no more than 20 years of military service. In addition, only moves in which the spouse accompanied her husband were included. For this study, the number of PCS moves was varied between 5 moves and 9 moves during a 20 year career.

Three components of PCS moving costs were examined in detail: unreimbursed moving costs, spouse income lost as a result of relocation, and part-time income for the military member that is lost during a move. All three of these components impact the total family income of an Air Force officer and his family.

The data for this analysis was obtained from the 1985 Department of Defense Survey of Officer and Enlisted Personnel, the 1985 Department of Defense Survey of Military Spouses, and the 1987 PCS Cost Survey. Probability equations were developed to estimate the probabilities of the spouse working (both full-time and part-time). These equations were then used to determine the expected values of spouse earnings for employment in the United States and overseas. The same procedure was used to estimate expected military part-time earnings. Finally, total expected family income was calculated for each of the 20 years of service.

An increase in the number of PCS moves has a negative impact on expected family income. In addition, rated officers have a higher annual family income annuity than nonrated officers.